

SWIMMING FOR ALL

797.2
V562S



ALLAMA IQBAL LIBRARY



18738

SWIMMING FOR ALL

Swimming for All

by

R. C. Venner

London

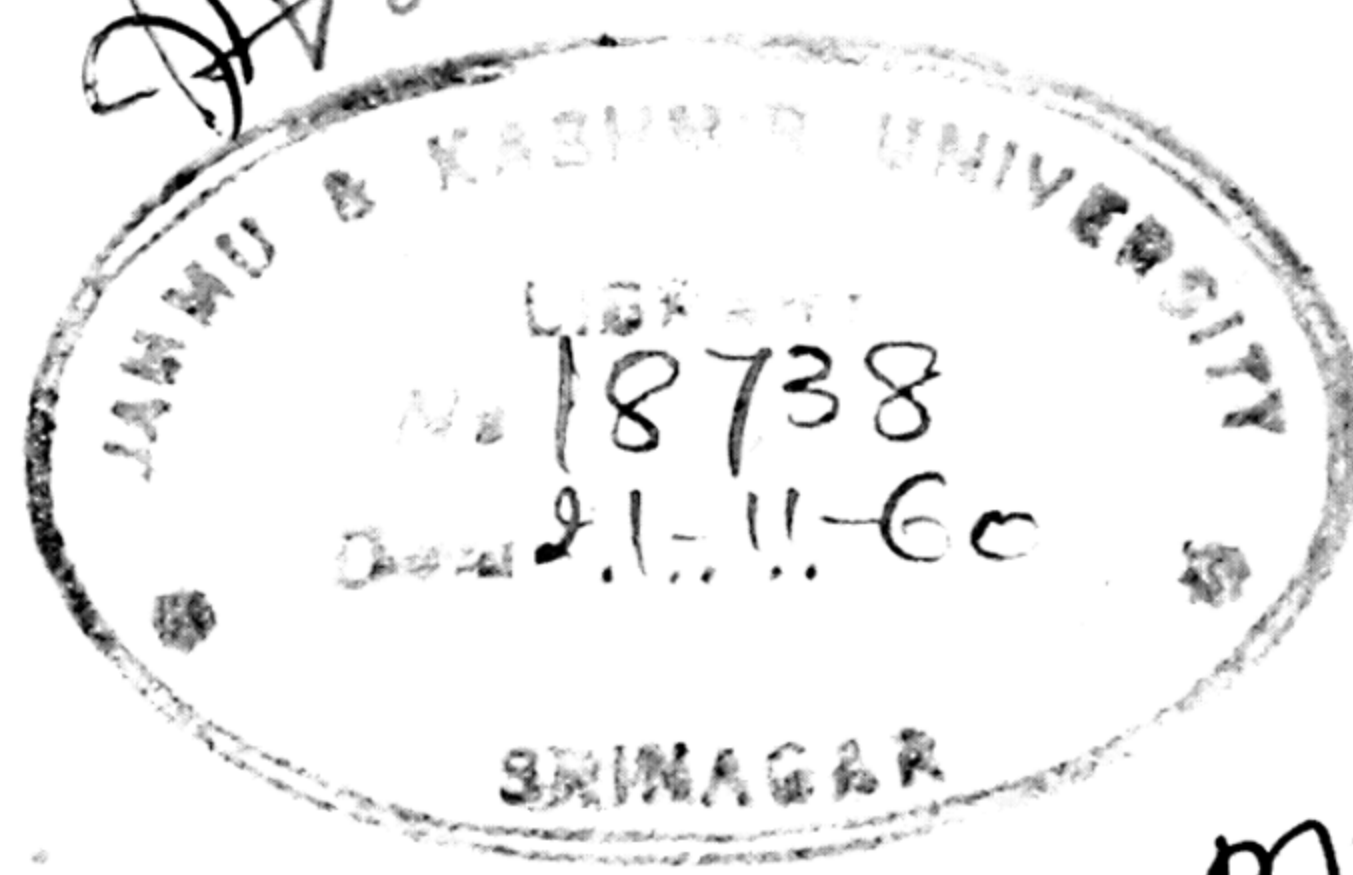
G. Bell and Sons Ltd

1931

CHECKED

MA

797.2
AV562-S



may

SHR
ST 01



ALLAMA IQBAL LIBRARY



18738

Printed in Great Britain by The Camelot Press Limited
London and Southampton

PREFACE

THIS book is called *Swimming for All* because it is hoped that it will be useful on the one hand to the practised swimmer who wishes to increase his speed or to make swimming a more interesting form of recreation, and on the other to the parent who is teaching his child to swim, or the timid bather who merely desires to enjoy the water with safety. Any intelligent person can teach himself to swim with its aid, but it is especially suitable for the use of instructors and school-teachers in charge of physical training.

The book is based on the following principles:

(1) That the management of the breath is for a beginner the most difficult and important part of the art of swimming.

(2) That breathing and the movements of the limbs are far more easily learnt on land than in the water.

(3) That, as movements in water have quite a different effect from movements in air, it is advisable to learn their effect by practising simple exercises in shallow water before any attempt is made to swim.

(4) That, as it is impossible for anyone to pay attention to the movements of all his limbs at the same time (not to mention breathing and other matters), each limb or pair of limbs must be practised in water separately.

(5) That the movements needed for support are different from those needed for progression, and that it is foolish and dangerous for anyone to learn to swim before he has learnt to support himself without effort.

(6) That all movements should at first be very slow, because hurried movements make it impossible to learn the correct action, and lead to risk of death by drowning.

(7) That the most economical and effective movements in swimming are not natural, like those of walking, but artificial, and need to be thoroughly practised in detail.

A complete course of instruction on land, comprising about one-fourth of the book, will be found in Chaps. II, Exs. 1-4, 16, and 23; IV, 1-4; V, 1-4; VI, 1-3; VII, 1 and 2; and VIII, 1, 2, 4, and 5. This course may well be followed in winter. It is suitable both for school gymnasiums and for home practice. Chaps. I and III and the preliminary remarks in Chaps. IV to VIII should be read in connection with it.

CONTENTS

CHAP.		<i>Ex. No.</i>	<i>Page</i>
I.	INTRODUCTORY		I
II.	PRELIMINARY EXERCISES		7
	Breathing with water in the mouth	1	9
	Breathing out under water with mouth open	2	10
	Holding breath	3	11
	Holding breath with lungs deflated	4	11
	Balancing	5	12
	Turning while erect	6	12
	Keeping balance when pushed	7	13
	Balancing on one leg	8	13
	Squatting and regaining feet	9	14
	Allowing body to sink	10	14
	Regaining feet when face downwards	11	15
	Floating, face down	12	15
	Gliding, face down	13	16
	Grasping an object for support	14	17
	Regaining feet when leaning back	15	18
	Paddling, on land	16	19
	Paddling, in water	17	20
	Floating on back	18	21
	Turning on face while floating on back	19	23
	Turning on to back when face down	20	24
	Gliding on back	21	24
	Gliding on side	22	24
	Circling with arms, on land	23	26
	do. in water	24	26
III.	MODERN SWIMMING		28
IV.	THE BREAST-STROKE		38
	Breathing, without water	1	40
	do. face in water	2	40
	Land drill, by numbers	3	41
	do. without numbers	4	43
	Leg-action on back, in water	5	44

CHAP.		<i>Ex. No.</i>	<i>Page</i>
	Leg-action on face, in water	6	45
	Arm-action in water	7	46
	The stroke	8	49
V.	THE CRAWL		52
	Breathing, without water	1	53
	Breathing with face in water	2	53
	Arm-action, by numbers	3	54
	do. without numbers	4	62
	Breathing at side when floating on chest	5	62
	Double over-arm, walking	6	64
	do. floating on chest	7	66
	The flutter, on back	8	67
	do. on face	9	70
	do. with breathing	10	71
	The stroke	11	72
VI.	THE SIDE-STROKE		81
	Arm-action, by numbers	1	81
	do. without numbers	2	84
	The stride	3	85
	Arm-action in water	4	87
	The stride, in water	5	88
	The stroke	6	90
VII.	THE TRUDGEN		93
	Arm-action, by numbers	1	93
	do. without numbers	2	98
	do. in water	3	99
	The stroke	4	100
VIII.	THE BACK STROKES		101
	Arm-action of the back crawl, by numbers	1	101
	do. do. without numbers	2	103
	The back crawl	3	103
	Another back arm-stroke	4	105
	Sculling	5	106
IX.	TURNING		107
	The free turn	1	107
	The racing turn	2	108

CONTENTS

ix

CHAP.		<i>Ex. No.</i>	<i>Page</i>
X.	DIVING		115
	Hands on bottom	1	115
	Swimming under water	2	116
	Dropping in from knees	3	117
	do. head first from feet	4	119
	do. with a spring	5	120
	The English header	6	121
	The swallow dive	7	122
	The racing dive	8	124
	GLOSSARY OF SWIMMING TERMS		126
	INDEX		131

ILLUSTRATIONS

	<i>Facing page</i>
I. BREAST-STROKE DRILL	41
II. CRAWL DRILL	56
III. SIDE-STROKE DRILL	82
IV. TRUDGEN DRILL	94
V. BACK CRAWL DRILL	102
VI. THE RACING DIVE	124
THE BREAST-STROKE, READY TO KICK	<i>page</i> 46
THE SIDE-STROKE, READY TO KICK	89

As one that ere a June day rise
Makes seaward for the dawn, and tries
The water with delighted limbs
That taste the sweet dark sea, and swims
Right eastward under strengthening skies,
And sees the gradual rippling rims
Of waves whence day breaks blossom-wise
Take fire ere light peer well above,
And laughs from all his heart with love.

SWINBURNE, *Songs before Sunrise.*

*(Reproduced by kind permission of
Messrs. William Heinemann Ltd.)*

CHAPTER I

INTRODUCTORY

IF you watch the bathers at any seaside place, you will probably find that most of those who can swim at all belong to one of three types. A swimmer of the first, and commonest, type attempts the breast-stroke in a more or less horizontal position (forced on him by the shallowness of the water in which he remains) with his mouth above the surface all the time. Now to swim in this way is for most people a very difficult if not an impossible feat, except for a very short distance, and even that is probably accomplished only by more or less holding the breath. It is true that there are individuals, with long supple neck, small head, and buoyant body, who are able, in salt water at least, to hold the head at right angles to the body with the chin above water, while the body floats breast downwards with its whole line near the surface. But these people are probably rare, and the ordinary learner, if he attempts to imitate them, is doomed to failure. The position induces in him a constant dread of his mouth going under water, and makes it impossible for him to swim without violent exertion. In his desire to keep his mouth above the surface, he forces himself up too high. This in itself is enough to make him sink between the strokes. To avoid sinking, he makes his strokes more rapid and vigorous; he gets more and more out of breath; in shallow water he struggles to his feet; in deep water, if no help is near, he drowns. At most seaside places one may see middle-aged men and women taking a few frenzied strokes through the water and then

standing up, very much out of breath. Most of them are not beginners; they have been doing this all their lives.

Secondly, there is the over-arm swimmer who keeps his mouth above water partly by sloping his body and partly by beating the surface with rapid and violent alternate movements of his arms. A muscular youth may make considerable progress in this way for a short distance, and may imagine himself to be swimming the crawl; but for that stroke there could hardly be a worse preparation.

A swimmer of the third type has learnt a movement of the arms not far removed from the supporting action described in Ex. 24, Chap. II; and by sloping his body so that it is not quite perpendicular, and kicking with his legs, he succeeds in progressing very slowly through the water. He does little more than support himself, and never improves. Any attempt to increase the slope of his body is apt to result in an alarming tendency for his mouth to go under water. He cannot swim against a tide, and if caught in a current he drifts helplessly. Nevertheless his performance is a great advance over the other two, and in ordinary circumstances he can at least enjoy the water without fatigue.

Of these ways of swimming the first two should be avoided altogether. If you are satisfied with the third, you need not go beyond Chapter II of this book. But if you wish to learn to propel yourself through the water you are advised to get into the habit of breathing out under the surface, as this is the easiest way to acquire a good breast-stroke (Chap. IV), and is indispensable for the crawl and the trudgen (Chaps. V and VII). The habit can be acquired at home, without entering the water. Or, if you do not wish to acquire it, you can content yourself with the side-stroke (Chap. VI), and some form of back-stroke (Chap. VIII).

Most people, especially adults, when they try to swim for the first time without preliminary training, make violent and quite useless efforts to support themselves, straining all the muscles of the body and imagining that they keep themselves up thereby. They do not realize that it is the water that supports them. Some would-be swimmers have seriously injured themselves in this way.

Now it is quite a mistake to suppose that swimming is a strenuous or exhausting form of exercise. You can exert yourself when swimming as much or as little as you choose. In walking you have to support your own weight, and a feeble person may be unable to do so, and collapse on the ground. The same person, if swimming, would be supported by the water, as on a feather-bed. Swimming slowly is a luxurious form of exercise, and one admirably fitted for the aged and infirm.

Another mistaken idea is that ease in the water can only be attained by long practice and development of the swimming-muscles. Swimming certainly develops the muscles, especially if speed is attempted; but muscular development is not in the least necessary for swimming. Practice is needed, but mainly in the management of the breath.

But, though neither great effort nor muscular development is in the least necessary, it would be equally a mistake to suppose that it is easy to learn to swim, or, having learnt, to become a good swimmer. Swimming is a difficult art. Most people have hitherto found it difficult even to learn to support themselves for a few minutes; the proof is that nearly every one has tried, and that most have failed. Nevertheless every one, even though he has never entered the water or has a nervous dread of it, can learn to swim with comparative ease if he does so, not by trying to do

everything at once, but step by step, practising in turn each of the simple exercises described in this book. To swim well is another matter. That art, still rare, can only be acquired by long and careful practice of the movements in detail.

It is usual to make light of the difficulties; it may be thought that I make too much of them. But if this be a fault, it is surely a fault on the right side. In swimming, as in other subjects, difficulties which are unknown and unsuspected puzzle and dishearten the learner, and are seldom overcome by him; nor does he even feel any satisfaction in surmounting them, since he is unaware of their existence. Those of which he is warned, and of which he knows the nature, are not only more easily surmounted: the more formidable they are, the greater the joy of conquering them.

The instructions in this book may seem elaborate and hard to follow, but they could not be simplified without impairing its value. They are elaborate because it is necessary to avoid ambiguity, – to be sure that you do the right movement and not something else. They are hard to follow if read without putting them into practice, because the movements, until they are tried, have to be mentally visualized before the text can be understood, and this cannot be done without an effort; but when put into practice they will be found quite easy. Illustrations are not really necessary. They are only useful if they call your attention to the fact that you have disregarded or misread the text. Any intelligent person who reads it can correct your movements equally well. Moreover illustrations have one disadvantage: they tempt the learner to imitate what he sees, as a monkey or a dog might do, and to save himself the trouble of reading and understanding the instructions.

This will nearly always result in his doing the movements badly.

Though one can learn to swim at any age, parents should realize that it is hardly possible to begin too young. The child's body has the suppleness which is essential for the making of a first-rate swimmer; he easily learns new movements; his muscles have not set; he has little of the adult's tendency to use wrong muscles, and to stiffen all the muscles of the body instead of allowing them to relax; above all, he acquires new methods of breath-control far more easily than an adult.

A young child is often naturally fearless, but it is all too easy to spoil him for the water. I have seen a boy of five, who could not swim a stroke, amuse himself when no one he knew was near by diving several times from a groyne into the sea and gliding along the bottom. The next day he was choking and spluttering and screaming himself hoarse as a result of his mother taking him in her arms and ducking him, presumably to get him used to the sea. There is no excuse for such cruelty.

All contrivances for supporting the body during the first attempts to swim, such as waterwings and belting attached to poles, are not only unnecessary, but harmful. They do not remove the fear of sinking; on the contrary, they perpetuate it by preventing the learner from discovering that it is actually difficult to sink one's body in water. They ignore the fact that the chief difficulty for a beginner is not the movements of the limbs, but the management of the breath and the subordination of the limb-action to the breathing. They merely teach bad habits, and gull the pupil into a belief that he is being taught to swim, when he is really only being taught the easiest part of the business (which should not be learnt, in the first place,

in the water at all) and left to master the real difficulties by himself.

One obstacle in the way of learning to swim is the lack of water to swim in. Even if water is available, it is usually too cold for a long immersion. Fortunately most of the difficulties can be overcome without going into the water at all. The most difficult thing to learn is the management of the breath, and this can be learnt on land. The movements, and their timing to fit in with the breathing, can also be learnt on land. All these things can be taught perfectly well in a gymnasium or school playground as part of the ordinary physical culture. The swimming-drill in this book provides in itself healthy exercise as good, perhaps, as any prescribed in books on physical training; and a great deal more interesting, since every movement learnt will be of use unaltered in swimming. All that remains is to apply the knowledge thus acquired to a new element, the water. For this special exercises and a certain amount of practice are desirable. But even without these exercises in water children who have been properly trained on land have acquired invaluable knowledge, which they can put into practice in their summer holidays or at the first opportunity of going into the water; and of this knowledge they can be trusted to make use.

For life-saving you are referred to the handbook (price 1s. 3d.) of the Royal Life-Saving Society, 8 Bayley Street, W.C.1. Every swimmer should be familiar with it, as he may be called upon at any time to save some one from drowning, and he risks his own life if he does not know how to proceed.

CHAPTER II

PRELIMINARY EXERCISES

THE first need of a bather who cannot swim is to be able to stand and walk about in water within his depth with ease and safety, and to get up without assistance if by any chance he finds himself down with his mouth immersed. This accomplishment may seem absurdly easy to some; but others are afraid to go into water even waist-deep. Its very buoyancy gives them a feeling of insecurity. They think that if they fall they cannot get up again. People have, indeed, incredible as it may seem, been drowned in quite shallow water. Having fallen forward and found their faces under water, perhaps for the first time in their lives, they struggled vainly till they choked. These accidents have resulted partly from inability to control the breath in unaccustomed circumstances, and partly from a failure to recognize and act on the fact that movements of the limbs in water have a different effect from similar movements in air. A person entering the water for the first time finds that every movement of his limbs has an effect just contrary to that which he expects. Upward movements send him down, downward movements up; forward movements send him back, backward movements forward. Even when he has learnt how to produce certain effects, his efforts to produce them are often frustrated by the movements of other limbs. Until he has learnt to control his breath in new ways, and has realized by experience how the body behaves in water, any attempt to swim is mere foolishness.

There is an old superstition among sailors that those who

learn to swim are more likely to be drowned than those who do not. In a sense – though not in the sense in which the belief is held – this is perfectly true. Indeed people are drowned every year as a result of learning to swim, because they have learnt to swim a short distance (far enough to carry them into deep water) without first acquiring the art of supporting themselves indefinitely when out of their depth. Breathless and exhausted, they inevitably choke and drown unless help is at hand. To try to run before one can walk is proverbially foolish, but at the worst it only leads to a fall. To try to swim before one can support oneself for a reasonable time in deep water is more foolish, for it may lead to death by drowning.†

The exercises in this chapter are intended to get the learner accustomed to the behaviour of his body in water in the first place, and then to teach him to support himself without effort. He should not attempt to swim until he has learnt these things. But there is no reason why he should postpone learning the exercises on land, either in this chapter or in those on the swimming-strokes, until he is at home in the water. On the contrary, all the land-drill, and especially the breathing exercises, may well be learnt before he goes into the water at all.

The art of swimming is in great measure that of controlling the breath in the water, or at the surface, in such a way that the swimmer neither takes water down his windpipe, nor swallows water, nor gets out of breath. You can learn all the movements necessary for supporting you in the water in five minutes. You will be safer if you have practised them till they have become subconscious, but this is not absolutely necessary. It is otherwise with breathing. The normal process is on land an unconscious one, and you cannot become a swimmer until you are able to control your

breath unconsciously, or at least subconsciously, in a way quite different from the normal. To do so requires considerable practice, for it entails the formation of new habits. The older you are, the more difficult it is to form a new habit. For a child it is comparatively easy.

In the first four exercises of this chapter, therefore, you will practise at home certain forms of breath-control. Others, more difficult, are left to the chapters on the swimming-strokes.

Breathing in through the nose should be avoided at all times, because it is impossible to prevent water from getting into the nostrils and (if the passage from the nose to the windpipe is left open, as it is in breathing through the nose) from passing into the windpipe, or "going down the wrong way." We are more accustomed to water in the mouth, and unconsciously close the windpipe against it, either by holding the breath or by the action of swallowing. Breathing out may be through nose or mouth, or both. Probably most good swimmers use both simultaneously.

Most beginners imagine that they can keep water out of the windpipe by closing the lips tightly. They are wrong, for it can still enter by the nostrils. Water must be kept out of the windpipe by closing the entrance to the windpipe. Lest he forget this, and try to keep the water out by closing his lips when immersed, the beginner should practise keeping his mouth open under water. The object of the first exercise is to enable him to learn to get rid of water in his mouth without swallowing or choking.

1. Breathing with water in the mouth

In this exercise it is essential that breathing should be through the mouth only. To ensure this the nostrils may if necessary be held with the fingers.

Take a little water in your mouth. Don't swallow it, but breathe through the mouth if possible. If there is too much water for you to do this, hold your breath, and eject a little. Now try again. If you can now breathe, throw your head back, and prevent the water from entering your windpipe. Take a little more water, and see how much you can hold in your mouth while breathing through your mouth easily and regularly. Practise till you close the wind-pipe automatically whenever there is any tendency for water to enter it.

2. Breathing out under water with mouth open

Get into a bath, or fill your wash-basin with water. Put your face in the water, open your eyes beneath the surface, and breathe out gently through your mouth with your eyes open. To breathe in, raise your head slightly, so that your mouth is just above the surface, and take in air silently through the mouth. If you have any difficulty, repeat till the process becomes easy.

When breathing out you may find that you have a tendency to stop in the middle and then go on. If you put your finger on your Adam's apple you will probably find that when you stop the Adam's apple goes up and then down. This shows that you are swallowing, and as there is nothing else to swallow you are probably swallowing air. The air goes into your stomach, and causes breathlessness, pressure on the heart, and perhaps even a feeling of sickness, which does not pass off till the air is expelled. Swimmers often get this feeling, and are unable to account for it. Indeed it is not confined to swimmers, for there is a case on record of a bicyclist becoming seriously ill from swallowing air during a two-hundred-mile race. It is important,

therefore, that the habit should be avoided from the beginning. Once acquired it is difficult to get rid of.

3. Holding breath

Take a deep breath, let it all out again, take another, and put your face into the bath or basin of water, this time holding your breath as long as you can, with your mouth and eyes open all the time. When you can hold your breath no longer, let it out into the water, raise your head, and breathe in.

Holding one's breath is often necessary, though undesirable in ordinary swimming.

Probably most adults, after filling the lungs well, can hold the breath for half a minute with no great effort, and with practice for a minute.

When taking a deep breath do not suck in air, but expand your chest and allow the air to enter silently.

4. Holding breath with lungs deflated

Take a deep breath, blow out till you can do so no longer, and at once, without breathing in, put your face in the bath or basin with your mouth and eyes open. Hold your breath as long as you can. You will not, of course, be able to hold it nearly as long as you could with your lungs filled.

This practice is invaluable as enabling you to hold your breath when unexpectedly ducked or covered with a wave while your mouth is open and your lungs deflated.

In the following exercises it is important that all muscles not actually in use should be completely relaxed; that all movements should be made deliberately, and with the

minimum of muscular effort; and that breathing should as far as possible be regular and normal. There must be no straining, no jerky movements, no struggling to your feet, no gasping for breath.

If you are afraid at first to go into water neck-deep, begin in shallow water, bending your legs so that your shoulders are covered, and gradually increase the depth, as you gain confidence, until your shoulders are under water when you stand erect with feet together.

Plug each ear with a single piece of greased cottonwool, as large as it will admit comfortably, before putting your head under water, especially in those exercises in which the head is on one side. This will prevent ear-trouble.

Most of these exercises can be taught to young children at home in an ordinary bath, which can be made as warm as desired. If taught in a swimming-bath, Exs. 5, 6, and 8 should be practised a little (Ex. 6 without turning) before the pupils enter the water.

5. Balancing

Stand in water with your shoulders covered. Let your arms float at the surface of the water, palms down, fingers together, forearms pointing straight ahead, elbows bent, say at 135° . Press your arms down sharply. This will lift you a little out of the water, and off your feet. You will sink on to your feet again. Do not attempt to steady yourself with your feet, which are useless for the purpose, but use your arms in the water to balance yourself.

6. Turning while erect

POSITION – READY. Stand as above, but with your arms straight in front of your body.

RIGHT TURN. Face your palms left, and press both arms, without bending them, sharply down to the left.

This will lift you off your feet, and turn your body to the right. Do not attempt to turn with your feet, or to steady yourself with them. Use your arms only.

LEFT TURN. Face your palms right, and press both arms sharply down to the right.

RIGHT ABOUT TURN. Face your palms left, press your arms sharply down to the left, and swing them behind you.

This will lift you off your feet and turn your body right round.

LEFT ABOUT TURN. Face your palms right, press your arms sharply down to the right, and swing them behind you.

7. Keeping balance when pushed

Stand as in Ex. 5. Get some one to push you in different directions, from the sides, the back, and the front. Press your hands in the direction in which you are pushed. This will make it impossible for any one, however much stronger than yourself, to push you over. Do not attempt to retain your foothold. Use only your arms to steady yourself. As long as you are standing in water your feet are quite useless for this purpose.

8. Balancing on one leg

Stand as in Ex. 5. Using your hands to keep your balance, let your left knee float slowly up to the left as high as it will go, your leg below the knee hanging quite loose in the water. Keep it where it is for a few seconds. Observe that the effort needed to do this on land is quite unnecessary in the water. Put your foot down again, and do the same with the other knee. Do not attempt to balance yourself with the foot which is down, but use your hands.

9. Squatting and regaining feet

Stand as in Ex. 5. Bring up both your knees, wide apart, the lower legs hanging loose and the body above the hips remaining upright. Press your hands down smartly to prevent your mouth from going under water, and put your feet slowly down again.

The nearer your mouth is to the water before you bring your knees up, the less likely it is to sink below the surface.

✓ 10. Allowing the body to sink

Stand as in Ex. 5. Take a deep inspiration, hold your breath, and lift your feet so that your shins are horizontal, your knees a little in front of you, and your heels a little behind you. Let your body, the trunk remaining upright, sink as far as it will go. Open your eyes under water. Unless you are extraordinarily wanting in buoyancy, your body will not remain down, but will come up of itself, without any help from your hands. Give it time to do so. When your mouth regains the surface, put your feet down, and stand up.

This exercise will probably convince you that if you fill your lungs and hold your breath you cannot sink far, but will come up again like a cork, though less quickly. The lower you are in the water when you begin, the more difficult you will find it to sink your body. The reason for assuming the position described is that it will counteract the tendency for your body to fall forward in the water.

You can roughly test your buoyancy, or weight in water, by this exercise. If you cannot sink yourself to the bottom after a full breath, try with an ordinary inspiration. If you still do not reach the bottom, try after breathing out in the ordinary way. If your body then comes up of itself, take

a deep breath, blow out hard till you have emptied your lungs as much as possible, and try again to stay down, continuing to blow out under water, – for you will find that you can still make bubbles even after you have done everything possible to empty your lungs above the surface. The test should be carried out in water chest-deep. If your body does not come up of itself, press your hands smartly down, and stand up.¹

11. Regaining feet when face downwards

Stand as in Ex. 5, but with your arms straight in front of you. Still allowing your arms to float at the surface, and taking a deep breath, bend forward till your face is submerged between your arms. You may find that your feet tend to leave the bottom, owing to the buoyant effect of the water. Allow them to do so. Now, with hips well bent, press your hands down sharply, so as to bring your body into a sitting position, knees wide apart; put your feet slowly down, and stand up.

12. Floating, face down

First try to kneel on the bottom in water chest-deep as in Ex. 10, after inflating your lungs as fully as possible. If you can do this, it is no use trying to float, either on your face or on your back; you are not buoyant enough. If you cannot kneel on the bottom as above, proceed with this exercise. This test is not necessary in salt water.

Stand as in Ex. 5, feet together, take a deep breath, and let your arms float at the surface. Let your whole body, without bending and without stiffening, fall very gently

¹ When you are a fairly proficient swimmer you may be tempted to try going down *in deep water* after blowing out the breath from your lungs. This is dangerous, as you may sink too deep and have difficulty in holding your breath till you regain the surface.

forward in the water till your face is submerged between your arms. Hold your breath, and keep your eyes open. If you are fairly buoyant, and keep your face below water long enough, you should feel your legs slowly floating to the surface. When you can hold your breath no longer, begin to let it out, bend your hips and press your hands sharply down so as to bring your body into a sitting position, put your feet down, and stand up.

If your legs do not come naturally to the surface, assist them by moving them up very slowly, without bending your knees, one after the other, by the use of the hip-muscles. If they still remain low, try bending each knee a little as you bring the leg up, and then, when the knee has been raised as high as possible by action from the hip, suddenly and forcibly straighten the leg.

The ease with which you will propel yourself through the water, when you have learnt to swim correctly, will depend very much on the behaviour of your legs in this exercise. If they come to the surface naturally, your task will be easier than if they have to be brought up by bending the knees. If you really cannot bring them up at all without bending the knee, it is doubtful whether you will be able to crawl in fresh water, except with a rapid and powerful arm-action.

If you find you have a tendency to roll over to one side, lower your head. If you still tend to roll over, practise till you are able to balance yourself. A certain amount of balancing in the water is necessary. To some it is natural; others have to acquire it by practice.

13. Gliding, face down

Stand with your back to the side of a swimming-bath, about waist-deep. Extend your arms straight, or as straight as you can get them, above your head, knuckles

front, fingers closed, little fingers touching. Turn your palms front without moving your elbows, so that your thumbs are together. Bend down, still with your head between your arms, so that your face is near the water. Lift up one foot backwards and place it firmly against the wall behind you, as high as the knee. Take a deep breath, put your face in the water, and push yourself away from the wall with that foot. You will glide, face down, at the surface of the water towards the other side of the bath. Hold your breath and keep your eyes open. Let your legs, held close together, trail behind you. When you reach the other side, or can hold your breath no longer, bend your hips and press your hands sharply down so as to bring your body into a sitting position, put your feet down, and stand up.

Your legs will come to the surface more easily than in the last exercise, because the resistance of the water tends to force them up. This resistance may also enable you to glide some way without sinking, even if you are heavier than the water you displace.

The last paragraph of Ex. 12 applies to this exercise also.

✓ 14. Grasping an object for support

Float on your face with your arms extended straight in front of you, palms down, fingers together, your hands an arm-length from the rail or other object to be grasped. Move one arm, without bending it, down and back, beginning slowly and increasing in speed to a strong sweep, and let it drift at your thigh. This will send you towards the object, and enable you to grasp it with the other hand. Don't grab at the object while it is still beyond your reach, but wait till you have glided up to it.

15. Regaining feet when leaning back

Stand as in Ex. 5. Throw your head back, so that its back part is under water. Take a deep breath, and without bending at the hips or knees let your whole body fall back, quite limp, your arms floating at the surface, your head well back as before. Do not attempt to retain your foothold, but let your legs float up naturally with your body. If you are afraid of your mouth going under water, press your hands sharply down and back before it can do so. This will bring your head and trunk erect, and your legs more or less into a sitting position. Put your legs slowly down, and stand up.

Your mouth will not go under water if you do this movement correctly. Do not get flurried. There is plenty of time. Practise till you can get up coolly and without haste.

You should now, if you have practised these exercises sufficiently, be perfectly at your ease in shallow water; more so, indeed, than many swimmers are. The next step is to learn to support yourself without effort, so that it does not matter to you whether you have three feet of water below your chin, or thirty fathoms. It is not necessary for you to be able to swim in order to do this. Swimming, as the word is commonly used, is not merely supporting oneself, but making progress through the water; a far more difficult thing to do, on one's face at any rate.

✓ You can, as will be seen, support yourself on your back without moving your limbs at all, if you are buoyant enough; and in calm water you may be able to obtain perfect rest in this way. But the position has its drawbacks. You cannot see what is going on around you. Moreover, if water

washes over your face while you are inhaling, it may get into your windpipe; and, as you can see little or nothing of the surface, you cannot tell when water is going to wash over your face, and may not be able to close your windpipe in time.

An upright position of the head, therefore, is necessary for comfort; and, as some movements of the arms or legs are needed to support you in that position, you must learn these movements, and you should learn them before you begin to swim.

Not long ago it was reported in the papers that a doctor who was going to the rescue of two girls was drowned, though he was a good swimmer, owing to his trousers slipping down over his knees. Whatever was the real cause of the tragedy, the report showed the prevalence of the absurd idea that movements of the legs are necessary for the support of the body in sea-water. If you have learnt to keep yourself up without effort, you are safe even if you fall into fresh water with all your clothes on, though you may not be able to swim a stroke in the ordinary sense of the word. You are safer than a person who can swim several hundred yards, but tires in covering that distance and cannot keep himself up without great exertion.

16. Paddling, on land

(a) *By numbers*

POSITION – READY. Stand or sit, arms in front of you, elbows somewhat bent, forearms horizontal and a few inches apart, hands in line with forearms, fingers together, thumbs touching forefingers, palms down but turned slightly outwards, about 15° , so that the little fingers are somewhat higher than the forefingers.

ONE. Move your hands, still sloped outwards, and more

or less parallel, horizontally in opposite directions till they are about half your height apart.

TWO. Turn your hands a little so that they slope slightly inwards; that is, so that the little fingers are somewhat lower than the forefingers.

THREE. Move your hands, still sloped inwards, horizontally towards each other till they are a few inches apart as before.

FOUR. Turn your hands a little so that they slope outwards again in their original position.

(b) Without numbers

Perform the same movements without numbers, making quick easy passes to and fro, smoothly and continuously. Practise till the correct sloping of the hands, about 15° with the horizontal, becomes automatic. Be careful to keep your hands sloped all the time, to move them horizontally, to keep your fingers together, and to relax your muscles throughout as much as possible.

This is the easiest way of supporting yourself in deep water. Everything depends on the correct and continuous sloping of the hands. It is better not to slope them at all than to slope them wrongly. But if you are nervous or breathless or excited when you find yourself in deep water you are sure to slope them wrongly, unless you have practised the movement till the correct sloping has become automatic.

17. Paddling, in water

Stand as in Ex. 5. Begin paddling as above, take a deep breath, and sit down slowly in the water, paddling all the time, with your mouth just above the surface, your body upright or leaning back, your thighs more or less horizontal,

your feet off the ground, and your legs below the knee hanging loose or floating. Hold your breath at first, but breathe naturally through the mouth as soon as possible.

Don't stiffen your muscles. Your thighs are supported by the water, and no appreciable muscular action is needed to keep them up. If you perform the movement correctly you should have no difficulty in keeping your mouth above water all the time, even if you are not very buoyant. But it is no use trying to keep it a foot above the water. The only effect of such an attempt will be to sink your head beneath the surface. Beginners often find it difficult to get rid of the notion that the mouth is more likely to go below the surface the nearer it is to it; just as a finger is more likely to get burnt the nearer it is to a flame. The proposition is true of the finger and the flame, but untrue of the mouth and the water. The nearer the mouth is to the water, the less likely it is to go beneath the surface. If the surface is ruffled, a little water may wash into the mouth, but it can be ejected without difficulty. If there is a swell, the body will rise and fall with it. Your first attempt, however, is best made in calm water.

/18. Floating on back

This exercise will be easy in proportion to your buoyancy, which you have already tested in Ex. 10, p. 14. Buoyancy is weight in water, which is quite a different thing from weight in air. A sixteen-stone man may weigh in water less than an eight-stone man. In fresh water, with the lungs fully inflated, most men are a few pounds lighter than the water they displace. I am $3\frac{1}{2}$ lb. lighter when I have taken a deep breath, and $3\frac{1}{2}$ lb. heavier when I have forced out as much of the air in my lungs as possible, a difference of 7 lb. Women and children are lighter in water than men, and

children become less buoyant as they grow. Sea-water is on the average about one-thirtieth heavier than fresh. If, therefore, a ten-stone man is 1 lb. heavier than his bulk of fresh water, he will still be able to float in the sea, being 3.6 lb. lighter than the sea-water he displaces.

If you can kneel on the bottom with your lungs fully inflated, it is no use trying to float. Later on, when you have had some swimming, you may find that you have acquired a greater lung-capacity, and you should then test yourself again. In any case you should have no difficulty in floating in salt water. If you cannot kneel on the bottom as in Ex. 10, or are practising in salt water, proceed with this exercise.

Stand as in Ex. 5, but in rather deeper water, so that your mouth is just above the surface when your head is erect. Throw your head back as in Ex. 15. Bend your knees a little – not your hips – so that all but your face is under water. Then, very gently, taking a deep breath and keeping your head as far back as possible, lie back as in Ex. 15. If you feel your mouth about to go under water, press your hands down and stand up; but if you go back gently enough you will find that your mouth does not go under. Continue to lie back, keeping your forehead just under water, and your legs in line with your body or bent back at the hips, and let your legs float gradually to the surface. If you find a tendency to roll over, spread out your arms, moving them gently outwards under water. If your legs do not come up, slowly move your arms (all the time under water, by depressing your elbows and turning up your palms) to their full length behind your head, floating at the surface. To get up, bring up your knees and press your arms sharply down, whether they are behind your head or at your side, and bring your head forward. Your trunk will now be

erect, and your head out of the water. Put down your feet, and stand up.

At your first attempt it may be well to hold your breath all the time. If you are successful, try breathing in and out a little, in short quick breaths, so as to keep as much air in your lungs as possible. If you are very buoyant, or are making your attempt in salt water, you will probably be able to breathe naturally.

Smooth water is essential for this exercise. There is no advantage in letting the mouth and nose go under, and it is unpleasant, as the water runs up the nose. Don't be discouraged if, from lack of nerve, you are not at first successful. If you fail, content yourself at this stage with learning how to get up coolly and deliberately after lying back.

Remember that the more of you there is under water, the less likely is your mouth to go below the surface; and that the surest way to send it below the surface is to raise your arms, or any part of them, above water. The more you throw your head back, the easier it will be to keep your mouth out of the water. If you are very buoyant, you will be able to hold your head up without immersing your mouth; but you will find that this tends to make you roll over to one side, unless you spread out your arms.

✓ 19. Turning on face while floating on back

Float on your back within your depth, your arms spread. Inhale deeply, sweep one arm smartly inwards, keeping it horizontal, and at the same time raise the other in the air. This will turn you over on to your face, with one arm under your body and the other at the surface. (If you sweep your left arm inwards, you will roll over to the left, with your left arm under your body; if you sweep your right arm inwards, you will roll over to the right, with your right arm

under your body.) Carry the under arm to the surface, bring your knees forward, press your hands down, and stand up. Hold your breath all the time.

20. Turning on to back when face down

Float face down as in Ex. 12. Press one arm sharply down, bending it at the elbow; then leave it loose. If you press down the left arm, you will roll over to the right on your back; if the right, you will roll over to the left.

21. Gliding on back

Grasp with both hands in front of you a rail or other support at the side of a swimming-bath. Bending at your hips and knees, and getting your body as low as possible in the water, plant your feet against the side of the bath a little below the surface. Take a breath, let go of the support, and slowly straighten yourself out. Hold your head up, and let your arms drift at your sides. You will glide slowly on your back towards the other side of the bath.

No water will wash over your face if the surface is smooth and you start with your body low and do not push off from the wall. After some practice you will be able to push off strongly and still keep your face free of the water.

22. Gliding on side

Stand with your left side to the side of a swimming-bath; extend your right arm horizontally to your right, fingers together, palm down; grasp with your left a rail or other support; and crouch down sideways till your right arm, still horizontal, and part of your head are below the surface of the water. Move your left foot sideways, and plant it against the wall below your left hand; then move your

right in the same direction, and plant it below your left. Hold your breath, let go of the support, and slowly straighten yourself out, keeping your right arm at the surface. Glide with your left arm and legs trailing, one above the other, and your right arm pointed forward in advance of your head, palm down. Stay on your side as long as you can; then roll on to your chest, bring up your legs, press down your hands, and stand up.

Now stand with your right side to the side of the bath, extend your left arm at the surface, hold on with your right hand, and repeat the exercise lying on your left side. Do not practise more on one side than on the other, unless you have more difficulty in keeping your balance on one side. If you have, practise more on that side till you can glide on either side with equal ease.

Keep your back straight, and your head in line with your body as in the directions for the crawl drill, p. 57. If your head is inclined towards your chest you will tend to roll on to your chest; if towards your back, on to your back. Your legs, as seen from above, should also be in line with your body. The upper hip should be kept well up near the surface; a sideways bend, once the habit is acquired, is difficult to get rid of. There is no need to slope the body for breathing, since the face can be turned upwards if there is any difficulty. It is easier to keep one's balance if the head is carried low. When you have learnt to balance yourself, you can raise your head sideways a little. It is more difficult to balance yourself on your side than on your face or back, and you will probably need a good deal of practice. This is worth while, for until you have learnt the art of balancing yourself on your side you are not likely to acquire a good side-stroke or trudgen.

23. Circling with arms, on land*(a) By numbers*

POSITION – READY. Stand or sit, arms straight and extended horizontally in front of you, thumbs touching, fingers and thumbs together, palms down but turned slightly outwards as in Ex. 16, p. 19.

ONE. Move your hands horizontally in opposite directions, without altering their slope and without bending your arms, till they are half your height apart.

TWO. Slope your hands inwards as in Ex. 16, bending your fingers slightly at the same time, and bring them in to the front of your chest, thumbs together, fingers pointing to the front.

THREE. Level your hands, tilt them up so that the tips of the fingers are somewhat higher than the wrists, and push them out straight in front of you.

FOUR. Slope your hands outwards as at first.

(b) Without numbers

Perform the same movements without numbers, smoothly and continuously. Practise till the correct sloping of the hands becomes automatic.

✓ This is another way of supporting yourself in deep water. It is best to learn more than one method, so that when your muscles are tired with one you can use another. The size of the circle made by the sweep of the arms does not matter; indeed it is better to vary it, bending the arms less and making a smaller circle, or more and making a larger one. As in Ex. 16, the important thing is the slope of the hands.

24. Circling with arms, in water

Stand as in Ex. 5. Move your arms as above, take a deep breath, and sit down in the water, circling with your arms

all the time, your mouth just above the surface. Hold your breath at first, but as soon as possible breathe in through the mouth when your arms are swept apart, and out through mouth or nose for the rest of the time.

CHAPTER III

MODERN SWIMMING

IF you let a stick float horizontally on the surface of your bath, a mere flick at one end will send it on some way, without any further assistance. But now hold it vertically, and move it rapidly through the water. Not only will it not continue to move of itself, but you will find so much resistance from the water that you have to use considerable force. If you hold it at an angle, say of 30° to the surface, the result will be something between these two extremes. Comparatively little force will be necessary to move it along, but that force must be continuous. The stick, if weighted at one end so as to remain at 30° to the surface, will no longer glide along of itself at a mere touch.

✓ This experiment illustrates the basic principle of modern swimming, which is that the body should lie in the water in a position as near to the horizontal as possible. In this position it needs comparatively little force to send it along, and the limbs can, if desired, be completely rested while the body glides through the water. Other principles of swimming are that forward movements of the limbs under the surface should be avoided as much as possible, owing to the resistance offered to them by the water; that all power should, as far as possible, be exerted directly backwards, since power exerted in other directions is, to that extent, wasted as a means of propulsion; ✓ that the stronger muscles of the body should be used rather than the weaker ones; and so on. But the most important principle of all, so far as speed is concerned, is the one first mentioned above.

In other branches of athletics, such as running and jumping, little advance has been made in the past fifty years. George's time of 4 min. 12 $\frac{3}{4}$ sec. for the mile, made in 1886, is still the professional record, and Nurmi has only beaten it by two seconds. It is otherwise with swimming. The time of 76 sec. for the hundred yards, made by Trudgen himself, was regarded as extraordinary in 1875; now Weissmuller covers the same distance in 51, and Miss Madison in 60.8. Trudgen's time is now beaten by little girls. If longer distances are taken, the time for the British mile championship in 1888 was 34 min.; Arne Borg's is 21 min. 6.2 sec., and Miss Madison's 24 min. 34.6 sec. Clearly this improvement is not the result of better physique or training, or of individual prowess. It is the product of better methods, and is mainly due to the difference mentioned above, that the swimmer skims along the surface of the water instead of ploughing his way through it.

But our bodies are so constructed that this is no easy matter. We can only go a few yards without breathing, and our mouths are so placed that we cannot breathe in when lying face downwards in the water. We can do so when lying on the back, or even on the side, but these positions are less favourable for speed than the other. The side-stroke, once the fastest known, has given place to the trudgen, in which the swimmer lies on his chest for about half the time, and the trudgen to the crawl, in which he is all the time on his chest. Breathing is made possible, even in the last, by turning the head to one side for a moment to take in air, and exhaling under water. The breast-stroke, the slowest and oldest of all, has been improved beyond recognition, and better time is now done with it than was done fifty years ago with the fastest stroke then known. In the modern breast-stroke the head is raised by the action of

the arms long enough to enable the swimmer to breathe in, but his mouth is under water for most of the time.

You may say that you intend to swim for health and pleasure only, and do not want speed. But swimming is a dull business if you do not know how to improve your stroke, whereas it is the most fascinating of pastimes if you are always adding to your ease and speed. Also you never know when you may need an efficient stroke. You may have to go to the help of some one in danger of drowning. You may find yourself battling against a strong current, and your life depending not so much on strength as on a scientific stroke, and above all on the horizontal position which enables you to elude the current's grip. And even when you are only enjoying yourself, an easy efficient stroke makes all the difference to your pleasure.

Another reason for learning the new method of breathing is that, once the initial difficulty is overcome, it is by far the easiest way to learn to swim. The movements of the breast-stroke are easy to acquire, but many have in the past found the breathing difficulties insuperable. With the new method the difficulty can be overcome before you enter the water, and failure is hardly possible.

But it is important to realize from the beginning that this manner of breathing is difficult until it has been thoroughly practised. Our normal breathing is unconscious, and before we can be at ease in the water, so as to be able to devote our attention to the movements of the limbs with this new method, we must practise it till it also becomes unconscious. Some people take much longer to acquire the habit than others. You may have to practise every day for weeks or even months before you can breathe in this way comfortably and naturally while thinking of something else; and until you can do so you will not be able to swim

the new strokes slowly, calmly, and at your ease, as you should do the first time you attempt them. Fortunately it is quite unnecessary that you should go into a swimming-bath in order to learn this method of breathing. All you want is a basin of water.

If, sitting where you are, you time your breathing with the second-hand of a watch, you will probably find that each breath takes something like four or five seconds, of which a second to a second and a half is occupied in breathing in and the rest in breathing out. You will not have to breathe faster when you are swimming, so long as you are swimming slowly, as beginners should always do. You will take one breath to each stroke, and it happens that four seconds to a stroke is about the right pace for beginners.

The movements of the limbs, and their co-ordination with the breathing, should be practised on land at the same time. You should not attempt them in the water until you can do them with perfect accuracy, both in direction and in timing, while thinking of something else. You will find that once your muscles have been trained to certain movements you will go on performing those movements automatically, in whatever position you may be. The essential thing is to get the movements of the limbs right with reference to the rest of the body, not with reference to the earth's surface. It is true that in the drill you are asked to imagine that the water is above you, or in front of you, or on one side of you. But you have only to imagine this once for all. It is not in the least necessary that you should visualize the water while you are doing the drill. On the contrary, visualization implies a conscious effort which only impedes you in action. The object of the drill is to enable you to perform the movements unconsciously, once the limbs are set going.

The less clothing you wear in the drill the better. A

large looking-glass is useful if you drill yourself, but it is better to get some one to give you the orders from the book and see that you carry them out accurately.

The usual way of learning in water is to give attention to one movement, say that of the left arm in the side-stroke, and to pick up the rest anyhow; afterwards, perhaps, each movement is studied in turn and the faults corrected. In the long run this is a very difficult way, for it may easily take ten times as long to get rid of a bad habit, once it is contracted, than to learn an entirely new movement.

Even an expert swimmer cannot think of all the complicated movements of his legs and arms, not to mention his breathing organs, at the same time. Much less can a beginner do so. If you think of the movements of your arms, you cannot know, in any but a vague sort of way, what your legs are doing; if you think of your legs, you cannot know whether you are carrying out the instructions with your arms. To attempt both together, until they have been well practised separately in the water, will inevitably lead to the formation of bad habits. These *may* be got rid of later on, but they are much more likely to remain for life. It is true that the exercises on land, if thoroughly practised, will make it much easier for you to do the same movements in the water correctly. But the conditions are different, and you will find it necessary to practise each movement separately in the water. When you come to use your arms and legs together you will have to give your whole attention to one thing, – the timing. You cannot do this satisfactorily unless the leg movements on the one hand, and the arm movements and breathing on the other, have been practised so long, on land and in the water, that you can do them correctly while giving your whole attention to something else.

When, as a beginner, you practise a stroke in water,

always start as if you had a long distance to go. Break your swim as little as possible. Beginners are tempted to hold their breath if they swim to and fro across a bath. Turning, moreover, upsets the breathing, and needs to be practised separately.

If you get out of breath, try not to stop, but to swim more slowly till your breathing becomes regular again. This may sound easy. You will be surprised to find how difficult it is. The natural tendency is to quicken the stroke so as to reach the next breathing-point earlier. It needs a strong effort of the will to do the opposite, but the effort is worth making.

If you can only go a short distance without getting out of breath, you are trying to do too much at once, and should return to the separate exercises. In any case you should return to them from time to time until your stroke is perfected. Unless you do so, you are pretty sure to get worse instead of better, and to develop faults which will be hard to get rid of later on; for it is quite impossible for you to pay attention to everything at once, or to be on your guard simultaneously against all the numerous faults to which you are liable.

If you use the book to teach yourself, you will find it useful to get a friend to read it also, and to perform the following services for you.

(i) He should watch your movements in the water, and point out faults. Even on land it is often difficult for you to know whether you are complying with the instructions, and inconvenient to be constantly consulting the book. When you are in the water it may well be that you can neither consult the book nor know what your movements are. But it is useless for him to attempt to follow the action of several differently-moving limbs simultaneously. To see whether their movements are correct, he should take each arm and

leg in turn, and watch its action through at least one complete cycle.

(ii) He should ascertain with a watch the time taken over each stroke. This should not be less than four seconds, or whatever time you normally take to breathe in and out once.

(iii) He should measure along the side of the bath the length of your stroke; that is, the distance covered in each cycle of your arms, or between the entry of your hand in the water and the next entry of the same hand.

Allowing for your build and length of limb, the length of your stroke is the best possible test of the correctness of your movements. Apart from the glide, which is lengthened by a strong drive, it is hardly affected, if at all, by the amount of force used. Given a certain length of stroke, your speed will depend, of course, on the number of strokes to the minute. It is only when the number is increased that strength, wind, and endurance come in; and these qualities are mainly natural, not acquired. The main thing to acquire is correctness of movements, and to swim a quick stroke before you have attained this is the worst way of trying to develop speed. Only when the correct movements have become so much a matter of habit that you perform them unconsciously when your stroke is quickened will it be time to think of swimming more strokes to the minute.

Weissmuller's account of his stroke shows it to be about seven feet long. In making a world's record for the quarter-mile he took about two seconds over each stroke. Mrs. Corson took $3\frac{1}{2}$ seconds to each stroke in swimming the Channel. These facts show the absurdity of swimming, as most beginners do, at the rate of a stroke a second or even faster.

In the breast and side strokes the length of the stroke can and should be increased by a glide. In learning to swim the glide can hardly be exaggerated, if the breathing is not made uncomfortably slow. Even in racing it is a waste of power to reduce the glide below a certain length. What that length should be can only be determined by timing the swimmer over the distance. In the crawl too, as will be seen, there is something resembling a glide after each arm-pull.

It is sometimes suggested that no one can say what are the best movements in swimming, and that each individual should be allowed to develop his own style. This theory is not borne out by the facts, which show that the best times are in the long run made by swimmers with the best style. The fact that Bacigalupo makes excellent time for the mile in the crawl without using his legs does not prove that he would not do better still if he used them. The laws of mechanics are the same for all of us, and we are all built much alike. The chief difference between us is the relative strength of the arms and legs, some strokes being more effective for those with strong arms and others for those with weak arms.

A man's head weighs next to nothing in water, and about ten pounds or more in air. To raise it from the water by bending the neck is therefore like placing a weight of several pounds between the shoulders, and must tend to sink the whole body, impair speed, and make breathing more difficult. This is so even if the body is kept nearly horizontal, but any effort to raise the head is sure to result in the body being sloped downwards and thus causing still greater resistance. It is true that, except in the breast-stroke, the top of the head calls forth more resistance from the water than does the face. But in the breast-stroke the hands act as a

cutwater in front of the head; in the crawl and trudgen the head is on its side for part of the time, during which resistance is not reduced by bending back the neck, while the difficulty of breathing is increased; and in the side-stroke the ear and not the face is presented to the water. In no case, therefore, should the neck be bent back. The head must not be sloped down, or there will be both an increase of resistance and a tendency to steer the body downwards; but it should be held in line with the body.

Weissmuller says the water breaks just over his brows when he is going at full speed; but his whole body lies so high in the water that his back is exposed almost to the waist, and ordinary swimmers must be content with a lower position.

In the crawl, trudgen, and side-stroke you should accustom yourself to breathe on either side with equal ease. If you can lie (or, in the crawl, breathe) on your left side as easily as on your right, you will be able without difficulty to watch the shore, or a boat, or possible obstacles, or a competitor in a race instead of having to turn your back on them. You can also turn away from the sun if it troubles your eyes, or from the wind if it blows water into your eyes and mouth. Preference for one side may be due, not merely to habit, but to inability to turn the head equally far to the other side. In that case you should practise turning it on land towards the side on which you have difficulty in breathing.

All the movements described in this book, whether on land or in the water, should be done vigorously, but with steady and regular breathing and a minimum of muscular effort. If this sounds contradictory, imagine that you, a weak swimmer, are starting on a swim of several hundred yards to rescue some one in danger of drowning. If you are

exhausted when you reach him, your efforts will be useless. You must therefore reserve your strength as much as possible, while making the most, by correct and careful action, of such muscular efforts as are necessary, and by using force only at the right moments. All swimming exercises, and all swimming, should be done on this principle. Therefore keep your muscles slack, except those which must be used for the movement you are practising, and relax even these as soon as possible after the movement has begun. Even the most vigorous movements, such as the kick in the breast-stroke, should be smooth, not jerky; and even the slowest should be closely controlled, not by stiffening the muscles, but by mental alertness and readiness to correct any error.

But while stiffening is to be avoided, sprawling, especially during a glide, is also objectionable. Arms and legs, and especially fingers and feet, must be kept in their proper place, and the body held straight; otherwise much of the advantage of the glide is lost, and there is unnecessary resistance in recovery. Excessive slackness is sometimes rightly taught at the beginning in order to wean the pupil from the opposite fault, but this practice can be overdone.

Your aim should be perfect control with no unnecessary use of the muscles. If this is attained, your movements will be graceful and effortless; your pleasure in swimming will be much increased; you will be able to swim long distances without tiring; you will have a reserve of strength for strong currents or heavy seas; and you will be able to maintain a speed which would otherwise be impossible.

CHAPTER IV

✓ THE BREAST-STROKE

OF all the strokes which can be used in swimming the breast-stroke is by far the easiest to learn. In its modern form the movements are simplified, and the chief difficulty which used to confront a beginner – the breathing – is removed, provided certain exercises are sufficiently practised before entering the water. He that is down need fear no fall, and he whose mouth is already under water no sinking. It happens, therefore, that the modern way of swimming, with the body and legs horizontal, and the mouth under water except during an inspiration, is not only the best for speed, but is also the most suitable for a beginner, even though he may not desire speed, but only healthy exercise in safety. The necessity of keeping the face under the surface for most of the time is certainly a drawback, especially in foul water. But once the stroke is acquired, and the fear of the mouth going under water overcome, the body can be sloped down, the mouth kept above the surface, and the stroke converted into one which, though very slow, is convenient for observation, and can be instantly changed to an effortless supporting movement.

The speed of the stroke has been greatly increased by the modern method of swimming it, but it is still the slowest of all. Nevertheless it remains a racing-stroke, because special races are arranged for it in which any departure from certain defined movements disqualifies the competitor. Neither the side-stroke nor the trudgen is thus honoured.

Propulsion, in the stroke here recommended, is entirely

by the legs, which are so used as to (1) enable the body to remain horizontal, (2) obtain a direct backward thrust with the soles of the feet, and (3) employ for it the most powerful muscles in the body, those of the hips. The action, which I call the sole-kick, is very far removed from that often recommended, which may be called the shin-kick. In the shin-kick the knees are bent back, so that the feet would appear above the surface if the body were horizontal; the thrust is partly back and partly down, and is made with the shins and insteps; and the only muscles used for this part of the stroke are those of the knees. Incidentally, the sole-kick is more suitable for a beginner, because the drawing up of the thighs makes it easy for him to get up when lying on his face in shallow water; if he bends his knees, as in the shin-kick, while keeping his thighs in the same plane as his body, it is impossible for him to get up.

Most swimmers compromise between the two kicks. That is, they draw forward their knees to some extent with the hip-muscles, and their feet with the knee-muscles. The result is a kick which is less effective than either of the others, since the toes are thrust against the water instead of the shin and instep.

The arms should be used only to raise the head for breathing. After many experiments I am convinced that the kind of pull here recommended, combined with a vigorous and effective kick, is the best for beginners, and for most swimmers the best even for purposes of speed. Some individuals with very strong arms may make better times by using their arms for propulsion, but they will probably do better still by adopting an entirely different stroke, in which the arms move much as in the crawl, but parallel to each other, and the leg-movements are reduced to a minimum. It is no use trying to get the maximum power

from *both* arms and legs. The resistance of the water is too great. If you make the utmost use of your legs, you must reduce the resistance caused by the recovery of your arms, and therefore the propelling power of the pull. If you make the utmost use of your arms, you must reduce the resistance caused by the leg-recovery, and therefore the propelling power of the kick. Most people are stronger in the legs than in the arms, and should therefore make the utmost use of their legs.

As the breathing exercises will probably call for longer practice than the other exercises on land, and are of great importance, they are given first.

Ex. 1. Breathing, without water

The following exercise should be practised for five minutes or more several times a day while walking, reading, etc., till this method of breathing becomes automatic.

Open your mouth and breathe in; close your mouth and slowly breathe out through your nose; force a puff of air out between your lips, and immediately breathe in again. Continue breathing in this way at your normal rate. Do not gulp or suck in air, but inhale silently.

You can test with the second-hand of a watch both your normal rate of breathing and that at which you breathe in this exercise.

Ex. 2. Breathing with face in water

Practise the above method of breathing with your mouth and eyes immersed in a bath or basin of water, only raising your head to take in air once every four or five seconds, or whatever your normal rate of breathing is. Continue daily, say for five minutes morning and evening, till you

PLATE I

BREAST-STROKE DRILL



END OF ONE



MIDDLE OF TWO



END OF TWO

can breathe in this way without thinking about it and without getting out of breath.

Ex. 3. Land drill, by numbers

When swimming you will lie on your face; in this drill you lie on your back. The movements are exactly those of swimming, but you are upside down. The level of the bed is the level of the water. You must imagine the water to be above you, and the air below. (But see p. 31.)

All devices for enabling the movements to be done on the face should be rejected, as they put an intolerable strain on the middle of the body. The movements of the arms can be done standing, as in the illustrations, and this is a good position for arm-practice provided you slope your legs back from the hips (see p. 56), look up towards the ceiling when you breathe in, and shoot your arms upwards.

Arms only

✓ **POSITION – READY.** Lie on your back across a bed or mattress, feet together, toes pointed away from you, legs horizontal, knees unbent, back level or sloping slightly down from hips to shoulders, head on the edge of the bed, so that you can see the upper part of the wall behind you. Extend your arms horizontally towards the back wall, elbows turned towards the ceiling (see directions below) and nearly straight, palms up, thumbs touching between hands, fingers close together and bent back, with fore-fingers touching.

ONE. Sloping your hands slightly outwards to right and left (so that the little fingers are rather lower than the thumbs), move them horizontally in opposite directions, without bending your arms, till they are half your height apart. As you do so, emit a slight puff of air between your lips, and then breathe in through your mouth.

TWO. Levelling your hands again, bend your elbows and move them towards your feet, bringing them as near to each other as possible, till your upper arms are vertical and your forearms horizontal. At the same time bring your hands together, palms up, fingers in line with forearms, thumbs and forefingers touching as before. Then, without any pause, and bending back the fingers, shoot your hands back to their original position. Breathe out gently through the nose all the time.

THREE. Continue to breathe out, with your arms in the same position.

The object of turning the elbows towards the ceiling is to enable you to bring them in straight to your chest. If turned outwards they will move in a circle, and the resistance of the water to this movement will retard you in swimming. To get them into the right position, extend the arms with palms down, and then turn the hands only. This need only be done once at the beginning of the practice. It will be found that once the elbows are turned the right way they will remain right throughout the drill.

Y Legs only

POSITION – READY. Lie as before, but with your arms beside you.

ONE. Emit a slight puff of air between your lips, and then breathe in through your mouth.

TWO. Slowly move your knees as wide apart and as far towards your armpits as you can, keeping your legs below the knee loose and parallel to each other, so that at the end of the movement your toes point to each side and your thighs make each an acute angle with your body. Breathe out through your nose all the time.

THREE. Without using your knee-muscles, straighten your

legs from the hips, thrusting them as far apart as you can. Then, without any pause, bring them together into their original position with as much force as possible. Breathe out gently through the nose all the time.

Your knees should move as nearly as possible in a horizontal plane. They should not, therefore, be raised above the bed more than is necessary. Your feet should be at right angles to your legs (see the illustration on p. 46) during the kick-out and while your legs are being forced together. As soon as they are together the toes should be pointed as before.

Arms and legs together

POSITION – READY. As for arms.

✓ ONE. Move hands apart. At the same time blow out and then breathe in through mouth.

TWO. Bring your hands together and shoot them out again. At the same time spread your knees and breathe out.

THREE. Kick out and force your legs together, continuing to breathe out.

All the movements, of both arms and legs, should be perfectly symmetrical. In other words, the movements of one arm should correspond exactly with those of the other arm, and those of one leg with those of the other leg.

Ex. 4. Land drill, without numbers

Practise the above without numbers. The movements should be continuous except after the completion of THREE. Pause at this point, keeping arms and legs in the same position, until four seconds (or whatever is the time you take over each ordinary breath) have elapsed since you began movement ONE. In other words, each complete cycle of the arms and legs, including the pause, should take as long as you usually take to breathe in and out once.

None of the movements should be jerky. Even the kick, though vigorous, should begin smoothly and gradually increase in force. You will probably find a strong inclination to make either a jerk or a pause at each moment of transition: when you bring your hands forward and shoot them back, when you draw up your knees and kick out, and when you begin to close your legs. There should be no suspicion of either, – neither a checking of speed nor a sudden quickening.

✓ **Ex. 5. Leg-action on back, in water**

Glide on your back as in Ex. 21, p. 24, and practise the leg-action as on pp. 42–3. At the end of movement TWO your knees should just show at the surface, shins parallel to each other, feet covered, toes pointing outwards. With this position your middle should be as high as you can get it. Movement THREE will then cause you to glide swiftly through the water. Your kick should be a steady backward drive, beginning with a mere push, increasing rapidly in force and speed, and culminating, as these reach their maximum, in a strong closure of the legs.

Your body during the glide should be horizontal throughout except the head, which should be slightly raised, your knees straight and pressed together, your toes pointed as in the drill; your hips well up at the surface; your arms at your sides. That is easy. It is more difficult to keep your hips up when you spread your knees; but if you want to make the kick effective you must not lower them too much. The ideal is to keep hips, knees, and feet at about the same level, as in the glide; but most people have to slope down their bodies from the shoulders to the hips, and their legs from the knees to the feet, in order to keep their feet below the surface. This necessitates a slight up-and-down

movement of the hips, which is ugly, but with most unavoidable.

Test your progress by measuring the length of your glide. You can do this by getting a friend to mark at the side of the bath a point opposite your hips when you begin the kick, and again when your body ceases to move. If your legs do not sink, you should easily go twice your length. Also measure the length of your stroke, from kick to kick, in the same way. With a stroke lasting four seconds you should soon be able to travel your length each stroke.

The head should be raised, but not so high as to strain the neck-muscles or slope the body down. A raised head sinks the whole body a little, but that makes it all the easier to keep the feet under water for the kick.

Ex. 6. Leg-action on face, in water

Glide face down as in Ex. 13, p. 16, and, keeping your back always straight and horizontal, move your knees forward and wide apart, shins horizontal and parallel to each other, toes turned out, as in movement TWO of the drill on p. 42. Then, without either pause or jerk, thrust out your legs and force them together as in movement THREE. Glide again, making yourself as straight as possible from the tips of your fingers to your toes, and pressing your upper arms against the sides of your head, until you cease to move. Then bring your knees forward as before, press your hands down, and stand up. Measure the length of your glide to test your progress.

A good glide requires a slight use of the muscles while it lasts, since every joint is naturally bent when the muscles are relaxed. It is particularly important that the finger-joints should be bent upwards, since any downward bend in them will be increased by the resistance of the water.

The illustration on this page shows the position of the legs when drawn up.

Now take a deep breath and kick repeatedly as before, but without waiting till you cease to move, until your breath gives out. Each stroke should take at first five or six seconds, and should never take less than four.



READY TO KICK

Get some one to measure the length and time of each stroke.

A stroke lasting four seconds should take you further than in the sole-kick on the back, as your hands act as a cutwater and there is nothing to prevent your shins during the kick, and your body all the time, from being perfectly horizontal. Don't omit to turn your hands, and so get your elbows down, as prescribed in the drill and in Ex. 13, p. 16.

✓ **Ex. 7. Arm-action in water**

Glide face down as in Ex. 13 on p. 16, breathing out gently as you do so. Your arms are now floating at the surface, thumbs together, elbows down and unbent. Now

move your arms, rather slowly and firmly, outwards from each other, thumb and fingers together, palms sloped slightly outwards, elbows unbent, as in movement ONE of the drill on p. 41. As you do so, raise your head a little, emit a puff of air through your lips, and then breathe in through your mouth. You will be able to breathe in, if the movement is correctly carried out, because the action of your arms, combined with the raising of your head, will place your mouth above the surface. Now draw back your hands and extend them again as in movement TWO, breathing in as long as you can, and then out as your face sinks into the water. If, as a result of this, you are out of breath, press your hands down and stand till you breathe again comfortably; if not, repeat the movement till you are out of breath or tired. The whole movement should be performed very carefully and smoothly, with the least possible disturbance of the water. Do not try to raise your mouth more than a very little above the surface; the higher you raise it, the lower and more quickly it will sink. The extent to which your arms should be moved apart, the angle at which the hands should be sloped, and the poise of the head depend on personal factors such as buoyancy, suppleness, and length of neck, and you should find out by experiment what suits you best. That suits you best which best attains your object, and your object should be to raise your mouth as little as possible above the water for just so long as you need to take a full breath, and no longer. Breathe regularly, and regulate your movements by your breath, not your breath by your movements. Get some one to time you in order to see whether you are breathing at your ordinary pace. Don't hold your breath, but breathe out while your mouth is under water. Don't gasp or suck in air, but inhale naturally through the mouth.

This exercise is the breast-stroke without the leg movements. Once you can perform it without getting out of breath, you will not only be able to swim (for the kick only affects your speed), but you will be able to go on swimming for an indefinite time without exhaustion. Not only so, but you will have laid the foundation of a good breast-stroke of the kind which suits you, such as few swimmers have now attained after years of practice.

It is essential that the body should lie just under the surface of the water. If your legs sink, use some artificial support. Air-tight cylinders or waterwings, placed under your hips or thighs, will probably be sufficient; or the inner tube of a bicycle, partly inflated, may be tucked into the front of your slip or costume from below. The support is more effective the further it is placed towards your feet; but it should be adjusted so that it is only just enough to keep your legs up, and should not be used at all if you can do without it.

When this exercise has been thoroughly practised, and you have attained the art of breathing comfortably with the minimum rise and fall, you can alternate it with the sole-kick described in the last exercise. In other words, you can raise yourself to breathe during the glide resulting from the kick. This is in effect the breast-stroke; but it is the breast-stroke swum with arms and legs alternately so that you can give full attention to each.

You will find it easier to get your mouth above the surface when you are gliding than when you are floating. That is because the resistance of the water during a forward movement forces you slightly upwards.

Some people, who combine buoyancy with a long and supple neck, can float on the chest and keep the mouth above the surface the whole time, at least in salt water. In

a smooth sea they may be able to dispense with the arm-action altogether. Others, whose bodies are heavier than the water they displace (see p. 21), are unable to float at all, at any rate in fresh water. If you are one of the latter class it is useless, of course, for you to attempt to breathe except during a glide.

Ex. 8. The stroke

You have learnt all the movements of the breast-stroke, with their co-ordination, in the drill. The only difference is that you were on your back, whereas in the water you must be on your face. You have also practised in the water the movements of both legs and arms, with the breathing. All you now have to do is to co-ordinate these movements in the water as you did on land.

Begin with the kick, but breathe out under water, and at the end of the glide move your arms apart as on p. 47. As you do so, emit a slight puff of air from the lips, and then breathe in. Now draw your hands back and extend them again, and at the same time bring your knees forward wide apart, breathing out under water. Then, in one continuous movement, thrust your feet back and bring your legs forcibly together (p. 45). Glide, still breathing out, till you need more air; then move your arms apart again, and so on. The order is kick, glide, arm-spread, recovery (arms and legs simultaneously), and kick again.

If you have really mastered the breathing and the drill, and practised the separate movements in the water, there is no reason why you should not go several hundred yards at your first attempt. Get some one to time your strokes if possible, and resist firmly any temptation to go faster than your ordinary rate of breathing. It is useful also, though less necessary, to keep a record of the number of

strokes needed to cover a given distance – say the length of the bath – in order that you may watch your progress. You should not attempt to go faster until you can cover at least the length of your body at each stroke. A good swimmer can easily cover twice his length.

The nearer your body is to the horizontal position, the less resistance will there be from the water, and the further you will glide. During and after the leg-closure your body should be horizontal from the crown of the head to the toes, until after the arms begin to open. Raise your legs by bending them back from the hips. Straighten your elbows and knees during the glide, bend back your fingers, and point your toes. When the head is raised to breathe, the legs must remain straight. Until the face goes under water again the slightest drawing up of the thighs will cause the whole body to abandon its horizontal position and to slope downwards. But the leg-recovery must not be hastened, as this will cause resistance from the water. It follows that it should not be completed before that of the arms. The co-ordination of the arms and legs, as given in the drill, is important, and you should adhere to it strictly.

It is important also that the elbows should be turned towards the bottom throughout. Unless this is done they cannot be brought straight in to the chest. They will move first outwards and then towards each other, squeezing out the water between the arms and the chest and causing great resistance. Therefore every time you swim the breast-stroke you should begin by extending your arms in front of you with the elbows and the backs of the hands down, and then turn the hands only.

Once a breath is taken no time should be lost in getting into a horizontal position again. The hands, therefore, should be shot forward quickly. This can be done without

calling forth any appreciable resistance from the water if the fingers are bent up (since the movement must be partly in an upward direction) and the fingers and thumbs of each hand kept well together. The hands should reach their full extension forward just as the kick begins, so as to provide a cutwater in front of the head. Any resistance of the water is greatly increased by the sudden access of speed produced by the kick, and should therefore be got over as much as possible before the kick begins.

Bear in mind the remarks made above (pp. 43 and 44) regarding symmetry and smoothness of movements, and on p. 37 regarding control of limbs. The least departure from symmetry spoils the appearance of the stroke, and any marked departure may cause disqualification in a breast-stroke race. Perfect smoothness is clearly essential in the arm-pull if resistance is to be avoided, but the need for it during the kick may be less obvious. Jerkiness at its beginning is nevertheless a common and a bad fault. If there is a jerk before the knees reach their forward limit, there is great resistance from the water; if just after, the effort is wasted, and spends itself too soon.

The back should be quite straight during the recovery. Raising the buttocks, besides being ugly, causes resistance from the water and also weakens the drive.

It is important that the thrust of the legs should be direct. Any lifting of the foot with the knee-muscles weakens the force of the thrust, and must be carefully avoided.

Nos. 1-4, 6, 11, 21, and 22 of the 'Don'ts' in the crawl (pp. 78-80) apply to the breast-stroke also.

CHAPTER V

THE CRAWL

THE crawl is the fastest stroke known. The swimmer lies flat on his face – the best position for speed – and there are no appreciable retarding movements. Much nonsense has been uttered about the violence of its action, its unsuitability for all but short distances, and the impossibility of acquiring it beyond a certain age. The truth is that when it is properly swum its movements are smooth and easy. If swum slowly, say at the rate of one cycle of the arms in four seconds, it is a comfortable stroke requiring no effort and enabling the swimmer to breathe at his natural pace. In August 1926, according to *The Times* report, Mrs. Corson swam the Channel, using the crawl all the way, at eighteen strokes to the minute, sometimes dropping to sixteen. She took on the average, therefore, nearly three and a half seconds to each stroke.

The crawl can be learnt at any age, but it does not follow that it is the best method of propulsion for everyone. An adult with weak arms may make better time with the trudgen or even the side-stroke, because he is then able to do most of the work with the far stronger muscles of his legs. It also has certain drawbacks: inability to look about one without slowing down, and immersion of the mouth for the greater part of the time, which makes it unsuitable for swimming in foul water. Nor is it at all an easy stroke to swim correctly, – and if not swum correctly it had better not be swum at all. The proper action, in which the forward arm moves very slowly while the other is at the most

vigorous part of its pull, needs long and careful preparation. Breathing is more difficult than in any other stroke; in each cycle of the arms only one moment is available for inhaling, and if that moment is missed the swimmer must wait till it comes round again.

As in the breast-stroke, the learner should begin with the breathing, but he may well start the drill in the arm-movements at about the same time. To move one arm by itself correctly is easy enough; to move both simultaneously in different ways and at different speeds is by no means easy.

Ex. 1. Breathing, without water

Turn your head as far as you can to the right, and keep it in the same position just long enough to enable you to breathe in through the mouth. Then begin to breathe out through the nose, and turn your head to the front. When you have nearly finished breathing out, emit a puff of air through the lips, turning your head to the right at the same time. Breathe in again through the mouth, and continue in the same way, say for ten breaths. Repeat for another ten breaths, turning your head to the left instead of to the right. Practise, ten breaths right and left alternately, at your normal rate of breathing as ascertained with a watch, till you are ready to continue this method of breathing in water.

Ex. 2. Breathing with face in water

Practise the above with your mouth, eyes, and forehead immersed in a bath or basin of water. Don't raise your head to breathe in, but turn it, getting as much as you can of your face up in the air and as much as you can of the back of your head down in the water. Test your rate of

breathing with a watch to make sure that it is normal. Continue daily, say for five minutes morning and evening, till you can breathe in this way without thinking about it and without getting out of breath.

You may find you have to practise for weeks before you can breathe comfortably in this way. But it is worth your while if you intend to learn the crawl, because you will have mastered the chief difficulty of the stroke. Remember that the mere ability to breathe consciously in this way is of no use; the breathing, once started, must be unconscious.

Ex. 3. Arm-action, by numbers

When swimming you will lie on your face. In this drill you stand erect. The movements of the arms are otherwise exactly similar. You must imagine the water to be in front of you, and the air behind you. (But see p. 31.) 'Upper arm' has the meaning given in the Glossary.

Right arm

POSITION – READY. Stand with head and trunk erect, feet together, legs straight and drawn back from the hips. Keeping your chest square to the front, but moving back your right shoulder, stretch your right arm upwards, elbow well back and a few inches (say a twelfth of your height) to the right of your head, forearm inclined a little to the left and slightly forwards, hand in line with forearm, fingers and thumb together, palm front.

ONE. Straighten your arm upwards, your hand slightly in advance of your shoulder.

TWO. Move your arm directly forwards and slightly downwards till it makes an angle of 15° with the vertical.

THREE. Move your arm directly forwards and downwards till it makes an angle of 45° with the vertical.

FOUR. Continue the downward sweep till your arm is horizontal and pointing to the front, palm down.

FIVE. Still keeping your forearm and hand horizontal, move your elbow back till it is at the side of your body and your upper arm vertical.

SIX. Move your elbow back and out from your body. At the same time drop your forearm, and let it hang limp, palm front.

SEVEN. Without moving your upper arm, straighten your hand and raise it to the right, by bending the elbow, till your forearm and hand point upwards and slightly forwards, palm front.

EIGHT. Move your whole arm upwards into its original position.

Left arm

POSITION – READY. Stand as before, shoulders square. Extend your left arm horizontally in front of you, palm down, fingers and thumb together and pointing front.

ONE. Still keeping your forearm and hand horizontal, move your elbow back till it is at the side of your body and your upper arm vertical.

TWO. Move your elbow back and out from your body. At the same time drop your forearm and let it hang limp, palm front.

THREE. Without moving your upper arm, straighten your hand and raise it to the left, by bending your elbow, till your forearm and hand point upwards and slightly forwards, palm front.

FOUR. Still keeping your shoulder and elbow well back,

move your elbow upwards till it is a few inches (say a twelfth of your height) to the left of your head, forearm inclined a little to the right and slightly forwards, hand in line with forearm, palm front.

FIVE. Straighten your arm upwards, your hand slightly in advance of your shoulder.

SIX. Move your arm directly forwards and slightly downwards till it makes an angle of 15° with the vertical.

SEVEN. Move your arm directly forwards and downwards till it makes an angle of 45° with the vertical.

EIGHT. Continue the downward sweep till your arm is in its original position.

At the READY and the end of movements SEVEN and EIGHT of your right arm, and at the end of movements THREE and FOUR of your left, your hand should be about a twenty-fourth of your height (say three inches in a tall man) in advance of your elbow. At the end of movement ONE of the right and FIVE of the left arm it should be a like distance in advance of your shoulder. At the end of movements SIX of the right and TWO of the left arm your elbow should be as far back and as close in laterally as is compatible with the position at the end of movement SEVEN (THREE) described above.

In TWO of the right and SIX of the left arm it would be simpler to say (for an adult 5 ft. 6 in. high), 'Advance your arm about six inches'; but the drill has to be made applicable to children also.

To draw back your legs from the hips, first stand with your trunk and legs vertical. Then, without moving back your body, and bending at the hips and ankles only, not at the knees, step back as far as you can with each foot in turn.

PLATE II

CRAWL DRILL

Breathing on left.

The position shown is that with which the movement ends. Thus ONE is the position reached at the end of movement ONE, and EIGHT is the READY position.



ONE



TWO



THREE



FOUR



FIVE



SIX



SEVEN



EIGHT

This movement is important, as it is through its means, and not by hollowing the back, that the legs must be kept up in the water. In the drill, however, the feet need be only slightly behind the line of the trunk. If they are far behind, the weight of the body will make the position too tiring to be maintained for long.

✓ Many people imagine that they are holding themselves erect when they hollow their backs, stick out their chests and stomachs, and incline their heads backwards. This is a bad position for any purpose. The small of the back, far from being hollowed, should be as straight as it can be made. To ensure this it is a good plan to stand with the back against a wall and try to touch the wall simultaneously with the heels, the hollows at the back of the knees, the small of the back, the spinal column between the shoulders, and the back of the head. The more nearly you succeed in doing this, the more erect you will stand, and the greater the height you will register if measured. If you are not accustomed to standing erect, you may find it at first something of a strain. If so, you should practise standing in this way for a short time daily until you can do so without strain or stiffness. A slight play of the muscles may still be needed to keep the body straight, but rigidity is fatal to good swimming, and must therefore be entirely avoided in the drill.

✓ To stand as required in the drill, keep your heels against the wall and move back your right shoulder as far as it will go, thus pushing your trunk away from the wall. In doing this bend only at the hips and ankles, and keep your trunk erect and your chest facing squarely to the front. You now touch the wall with your right shoulder and your heels only. Move your right elbow back and out to the wall, and you have position six: that is, the position reached at the

end of movement SIX. Bend your elbow till your forearm and hand point upwards, your elbow still against the wall and your hand, if you are an adult, two or three inches away from it, and you have position SEVEN. Raise your elbow along the wall (keeping your hand at the same distance from the wall as before) till it is as high as your ear and bent to the left at an angle of 120° , and you have position EIGHT, which is the same as the READY. Send your shoulder up along the wall and straighten your arm upwards so that the hand is still at the same distance from the wall, and you have position ONE. After this your shoulder should gradually leave the wall, till at FOUR it is forward. At FIVE it should be square and well down, and at SIX back against the wall again.

The drill should at first be performed against a wall in order to make sure that your arm is in the right position. After a time the wall may be abandoned, but you should return to it if you find any tendency for your arm not to be far enough back while your chest is square to the front.

The mechanism of the shoulder is complicated, and it is important that it should be used in the right way. The shoulder can be moved either (*a*) up or down, or (*b*) backwards or forwards, or (*c*) obliquely. At READY the right shoulder should be well back and down. During movement ONE it should be raised as far as it will go without strain, but still kept well back. During TWO and THREE it should go gradually forward, driving your arm in front of it. During FIVE it should return to its original position, well back and down. These instructions apply equally to the left shoulder in movements FIVE to ONE. Throughout these movements your chest must remain perfectly still. If you stand sideways to a mirror, stripped to the waist, you will see that you can send your shoulder backwards and

forwards some way without moving your chest to one side or the other.

✓ The muscles of the right arm and hand should be firm, but not too firm, during movements TWO to FIVE, and those of the left during movements SIX to ONE. In swimming the arm will have to overcome the resistance of the water during these movements. In SIX (left arm TWO) the resistance will be removed, and the action completed in the air; the muscles should therefore be gradually relaxed during this movement. They should remain as slack as possible until the beginning of movement ONE (FIVE), when they should gradually be made firm again.

As soon as you are able to do these eight movements with a fair degree of accuracy within four seconds, one arm at a time, you should begin to combine with them breathing as you will have to breathe in swimming. This is of great importance, and the only reason why I have not included the breathing in the drill from the first is that it is impossible, until you have attained to some degree of proficiency in the movements, to attend to both them and the breathing at the same time.

Breathing in on the right must be done during movements SEVEN and EIGHT, and breathing in on the left during movements THREE and FOUR, whether you are practising one arm at a time or both together. It will be convenient always to breathe in on the right when you are practising the right arm alone, and on the left when you are practising the left arm. When moving the right arm, turn your head squarely (or as squarely as you can) to the right and emit a slight puff of air through the mouth during SIX, breathe in through the mouth during SEVEN and EIGHT, and turn your head front during ONE. When moving the left arm, turn your head directly to the left and emit a slight puff of air through

the mouth during TWO, breathe in through the mouth during THREE and FOUR, and turn your head front during FIVE. Breathe out through the nose the rest of the time. Be careful to breathe out, not in, during ONE (FIVE). Complete the cycle in four seconds, or whatever is the time you usually take to breathe in and out once.

It is essential for comfort in breathing during the crawl that you should be able to turn your head well to one side. Ability to turn it directly to the right or left, if it does not exist at first, may come with the long practice needed before you pass to the next exercise. Practise turning it to one side only, if you find that it will not go as far on that side as on the other. See p. 36 on the importance of being able to breathe on either side.

When you have practised both arms singly, with breathing, till you can do the exercise with perfect accuracy while you are thinking of something else (just as a pianist can play a piece of music correctly and carry on a conversation at the same time) you should have little difficulty in performing the right movements with both arms at once. Any attempt made earlier is likely to result in failure.

Breathe on the side to which you have most difficulty in turning your head; or, if you have no difficulty, on each side alternately, – say ten breaths on one side and ten on the other.

Both arms

POSITION – READY. Stand as before, right arm raised, left horizontal.

ONE. Straighten your right arm and move back your left elbow.

TWO. Right arm at 15°, left elbow back and out, left forearm dropped.

THREE. Right arm at 45° , left elbow sharply bent.

FOUR. Right arm horizontal, left raised.

FIVE. Right elbow at side, left arm straight.

SIX. Right forearm dropped, left arm at 15° .

SEVEN. Right elbow sharply bent, left arm at 45° .

EIGHT. Right arm raised, left horizontal.

The eight movements are not equally rapid, nor do they cover equal distances in space; but they are about equal in duration. Their relative speed and the degree of firmness with which they are made are shown below.

	Speed		Muscles	
	<i>Right Arm</i>	<i>Left Arm</i>	<i>Right Arm</i>	<i>Left Arm</i>
ONE	very slow	rapid	becoming firm	firm
TWO	do.	do.	firm	relaxing
THREE	increasing	do.	do.	relaxed
		(hand only)		
FOUR	do.	slowing down	do.	do.
FIVE	rapid	very slow	do.	becoming firm
SIX	do.	do.	relaxing	firm
SEVEN	do.	increasing	relaxed	do.
	(hand only)			
EIGHT	slowing down	do.	do.	do.

It will be seen that one arm has to be moved very slowly and the other rapidly at the same time, and that the muscles have to be tightened in the one while they are being relaxed in the other. This, to one who has not practised it, is by no means easy; and it is not surprising that few of those who attempt to learn the crawl entirely in the water ever acquire the real movements. On land, however, the difficulty, once it is realized, can be faced with confidence, and with a certainty of reward in the satisfaction that comes of surmounting it.

Ex. 4. Arm-action, without numbers

Practise the movements in the last exercise with both arms simultaneously in one smooth continuous action, one cycle in four seconds or whatever time you usually take to breathe in and out. Take care to keep to the correct timing, to slacken your muscles at the right moments, and to breathe at the right point on one side or the other. If there is any tendency to get out of time, or to do the movements wrongly, practise again by numbers, each arm separately.

You will have for some time to keep a constant watch on yourself to see that you are doing movements ONE and TWO of the right arm, and FIVE and SIX of the left, very slowly. Only after much practice will you lose all tendency to quicken them when thinking of something else, and only then will you be ready to take to the water.

Ex. 5. Breathing at side when floating on chest

Stand with your back to the side of a swimming-bath, about waist-deep. Raise your arms so that they are vertical and parallel to each other on each side of your head. Bend down, your head still between your arms, and glide as in Ex. 13 on p. 16, breathing out gently as you do so. Your arms are now floating ahead of you and parallel to each other.

Now slowly but firmly depress your right arm a few inches, and at the same time turn your head to the left, emit a puff of air from your lips, and begin to breathe in through your mouth. Don't raise your head, but turn it as on a pivot, getting as much as you can of your face up in the air and as much as you can of the back of your head down in the water. The downward pressure of the right arm will tend to roll you over on to your left side. You

must counteract this tendency by throwing your weight on to the right, so that you roll, if anything, very slightly to the right. It is better, however, not to roll at all if you can breathe in without any roll, and you will probably be able to do this with quite a slight downward pressure of the arm. Now finish breathing in, and let your arm rise again to the surface. As it does so, begin to breathe out, and turn your head straight, - face down. Continue breathing out till (at your ordinary rate of breathing) you are ready for another inhalation, and then press your right arm down again, turn your head left, etc. If you get out of breath, bring your knees forward, press both arms down, and stand up till you have recovered; if not, go on till you have breathed, say, ten times, and then breathe in ten times on the right, pressing down the left arm. Practise breathing on the left and right alternately until you can do so without in the least degree getting out of breath.

When you have performed this exercise continuously for some minutes without getting out of breath, you have mastered the chief difficulty of the crawl-stroke. You have also learnt how slight a pressure of the arm is needed to enable you to breathe. Don't raise yourself more than is necessary; get some one to time your breathing, and breathe at your ordinary rate; breathe out all the time you are not breathing in; and don't gasp, or suck in air, but inhale naturally through the mouth. If your legs sink, support them as recommended on p. 48.

A slight downward pressure of one arm is probably necessary for most men to enable them to breathe comfortably while floating breast downwards in fresh water. Women and children, as we have seen, are more buoyant than men. You may be able to breathe in by simply turning your head to one side while floating on your face with your

arms extended at the surface. If you can do so, you should practise breathing in this way, without depressing your arm. In salt water even men of ordinary buoyancy can do this.

✓ **Ex. 6. Double over-arm, walking**

Stand chest-deep in water, and assume the **READY** position in the drill, p. 54. Bend down so that your face is in the water and your right arm just clear of it. Your left arm now points to the bottom. Go through the movements of the crawl as in Ex. 3, p. 54, substituting the horizontal for the vertical position of your body above the waist, and breathing on the left once in four seconds, or at whatever rate you normally breathe. As the drive of the arms through the water will send you forward, you will find yourself walking along the bottom. Continue for ten breaths, and then straighten yourself up again. Now assume again the **READY** position, bend down with your head turned to the right, and go through the arm-action of the crawl as before, breathing on the right. Practise, breathing at your normal rate on left and right alternately, till you can continue the exercise indefinitely without getting out of breath.

If you have practised the drill till the movements, once started, become automatic, the change from an upright to a stooping position should make no difference to you. Your arms should move mechanically. If you think of the movements at all you should think of them with reference to your body, not to the earth's surface. In case, however, you have any difficulty I give the substituted drill for both arms below. It should be regarded as explanatory, not as a new drill.

ONE. Right arm straight ahead at surface, left elbow at side.

TWO. Right slightly depressed in water, left back and out.

✓ THREE. Right at 45° , left elbow sharply bent, hand pointing forward.

FOUR. Right pointing to bottom, left forward, slightly bent.

FIVE. Right elbow at side, left arm straight ahead.

SIX. Right arm back and out, left slightly depressed in water.

SEVEN. Right elbow sharply bent, hand pointing forward, left arm at 45° .

EIGHT. Right arm forward, slightly bent, left pointing to bottom.

Starting from the last position (which is that of READY), and breathing on the left, slowly straighten your right arm, so that the hand is directly in advance of the shoulder, and press it firmly but slowly down in the water. Gradually increase the pressure till the arm points straight to the bottom. Then gradually bend the arm, further increasing the pressure, till the elbow reaches your side. At this point decrease the pressure till the forearm and hand are relaxed and washed back by the water, and lift them out of the water. Now, without moving the upper part of the arm, bend the elbow sharply, so as to carry the hand round almost in a semi-circle, close to the water, till it points forward. As soon as it does so, move the whole arm forward, close to the water, till your hand is in advance of your head as before. Your left arm meanwhile is performing exactly similar movements, starting from its vertical position in the water. Take ten breaths on the left, ten on the right, and so on.

You will probably find a tendency to bring the shoulders

into action too soon; this you should resist. Start with your right shoulder well up and back. Send it forward before the hand enters the water, but keep it well up until the hand is a few inches below the surface. Then, without in the least turning your body to one side, gradually lower your shoulder, making it drive your arm before it. As your arm begins to bend, your shoulder should begin to go up and back again, and it should be well up and back by the time your elbow reaches your side. Similarly your left shoulder should be down at the start, but up and back when your left elbow reaches your side, and should remain so until your left hand is a few inches below the surface.

If you find yourself being lifted off your feet at each stroke, you will know that you are applying the power too soon. Your aim should be not to lift yourself up, but to drive yourself on. The force, therefore, should not be applied till your arm is nearly vertical. It should go on increasing, as your arm is bent, till your elbow reaches the surface. The main propelling movement is done with the forearm vertical and the upper arm changing from the vertical to the horizontal.

Ex. 7. Double over-arm, floating on chest

Stand with your back to the side of a swimming-bath, about waist-deep. Raise your arms so that they are vertical, and parallel to each other on each side of your head. Bend down, your head still between your arms, and glide as in Ex. 13, p. 16, breathing out gently. Your arms are now floating ahead of you and parallel to each other. Go through the action of the crawl as in the last exercise, but with your body free in the water. Begin with movement two of the right arm, and join in with the left at the end of FIVE. Breathe once in four seconds, or at whatever rate

you normally breathe, and take ten breaths on the left, ten on the right, and so on. Straighten your legs at the knees, point your toes, and turn them in; then leave the joints of your knees and ankles loose. Keep your legs up with the step-back movement described on p. 56, and use your hip-muscles to prevent your legs from swaying from side to side.

If your legs remain at the surface, you can now crawl. You will probably, however, even if you lower your head, find it impossible to maintain a horizontal position in fresh water without some support for your legs. To attempt to do so by a rapid and exhausting arm-action (which does undoubtedly tend to keep the legs up as long as it lasts) is the surest way of acquiring a bad stroke. Use some artificial support, as recommended on p. 48, until you have acquired a good arm-action and learnt the leg-movements separately.

Ex. 8. The flutter, on back

Float with arms outspread, hips at surface, legs together and in line with body, toes pointed and turned in. Loosen the joints of your knees and ankles. Both will then show a slight bend. Keeping these joints perfectly loose, depress one leg as far as it will go by means of the hip-muscles. The resistance of the water will tend to straighten your leg at the knee and further bend the ankle-joint. Now raise the leg with the hip-muscles till it is again in line with the body, still keeping the other joints loose. The resistance of the water will tend to bend the knee slightly and straighten the ankle-joint. Practise a few times, till you are sure that you are using only your hip-muscles and leaving the other joints perfectly loose.

Now practise the same movements with the other leg, and then with both legs simultaneously, one being up while

the other is down. You will find yourself moving slowly in the direction of your head. Keep your toes turned in, and your legs as near as possible to one vertical plane all the time, only making a slight *détour* to prevent your big toes striking against each other. Your arms need no longer be spread out to keep your balance; let them go to your sides. Move your legs very slowly at first, and gradually increase your speed till each leg is depressed about once a second. This rate should thereafter be maintained. Practise the movement till you can travel, say, the length of an ordinary swimming-bath without getting tired and without any tendency to use muscles other than those of the hips. Measure your progress by counting the number of beats needed to carry you over a given distance.

You may at first have to place your arms behind your head, as on p. 22, in order to get your hips to the surface. Once you have begun moving, however, you will probably find that it is no longer necessary to keep your arms in this uncomfortable position, and that your hips remain up even when your arms are at your sides.

Your head may be either face-up or turned to one side, as you find convenient. If, while keeping your hips at the surface, you can hold your head high without strain, so much the better. Whether you will be able to do so depends on personal factors such as length of neck, weight of head, etc.

It may seem strange that so lazy a movement, in which your joints, except at the hips, are worked by the water and not by your muscles, should propel you at all. It does so because the sole of your foot, by its pressure against the water in the direction opposite to that of your head, sends you along when you depress your leg, and your shin, together with the flat of your instep, when you raise it; and

because the closure of the legs, by squeezing out the water between them, tends to propel you more than their opening retards your progress. You can now see the use of turning in your toes and keeping your legs near to one vertical plane. You present the flat of your instep to the water instead of the blade, which would cut through the water and be less effective as a propeller; and the feet approach each other almost directly instead of being in quite different vertical planes, which again would give the closure of the legs less propelling effect. The pointing of the toes is essential for speed, as a foot dragged through the water at right angles to the leg will probably retard as much as any flutter action will propel.

When a whip, flexible throughout its length, is sharply raised, it curves downwards; when it is brought down, it curves upwards.¹ If the whip is raised and lowered in water, the curves will be increased, as the resistance of the water is greater than that of the air. If we imagine the whip fixed (end on) at the stern of a small boat, and worked rapidly up and down by a motor, the boat will be driven along. Two whips, moving up and down alternately in vertical planes, would drive it along faster. In the flutter your body takes the place of the boat, and your legs of the two whips. The more supple your legs are, the better will your body be driven along. Some people, especially Asiatics, are so supple that they can not only make a straight line from the knee to the big toe, but can bend the foot back in a curve. Similarly they can not only straighten the leg at the knee like all of us, but can bend it so as to make a considerable backward curve from thigh to heel.

¹ A closer imitation of the human leg may be made by breaking a green stick downwards in one place to represent the knee of a person lying on his back, and upwards in another place to represent the ankle.

This exercise is intended as a training for the crawl on the face, not the back crawl. For the purpose of that training it is essential that the knee should be straight (or bent back) when at its lowest point. It must also not be raised above the level of the hips. Any appearance of either knee or toes above the surface, and any tendency to splashing, is a proof that the movements are incorrect. The exercise can be done at home in an ordinary bath.

Ex. 9. The flutter, on face

Glide face down as in Ex. 13, p. 16. Straighten yourself at the hips and knees, point your toes, and turn them in. Your legs are now in line with your body. Loosen the joints of your knees and ankles; both will then show a slight natural bend. Keeping these joints perfectly loose, raise one leg as far as it will go by means of the hip-muscles. The resistance of the water will tend to straighten your leg at the knee and further bend the ankle-joint. Now depress the leg with the hip-muscles till it is again in line with the body, still keeping the knee and ankle joints loose. The resistance of the water will tend to bend the knee slightly and to straighten the ankle-joint. Practise a few times, till you are sure that you are using only your hip-muscles and leaving the other joints perfectly loose.

Now practise the same movements with the other leg, and then with both legs simultaneously, one being up while the other is down. You will find yourself moving slowly forward. Keep your toes turned in, and your legs as near as possible to one vertical plane all the time, only making a slight *détour* to prevent your big toes from striking against each other. The movements should be at the rate of about one beat a second; that is, each leg should be depressed about once in two seconds.

You will probably find it best to hold your breath at first, so that you can devote your full attention to the movements of your legs. Or you can keep your mouth above water by placing your arms on a life-buoy or other buoyant object, supporting your legs if necessary as on p. 48.

The worst way of learning the flutter is to hold on to a rail or other support at the side of the bath, and move the legs rapidly up and down. The objection to it is that you cannot tell whether your movements are right or not. The nature of the flutter is such that probably no one can tell, except by the result. If they send you forward, they are more or less right; if they leave you stationary, or send you backwards, they are wrong.

When the leg is raised, the heel should just reach the surface of the water; and there is no objection to its appearing above the surface, provided the back of the knee is straight when the leg is at its highest point. But few swimmers, or at any rate few adults, have such buoyant legs. With most the appearance of a heel above the surface is a sure sign that the knee is bent, and therefore that the action is wrong. The difficulty will usually be to get the heels near the surface at all with a straight knee. If you find it impossible, support your legs as on p. 48.

Ex. 10. The flutter, with breathing

Glide on your face as in the last exercise; but, instead of holding your breath or supporting yourself artificially, breathe out under water and raise yourself (if necessary) just enough to breathe in, turning your head to one side as in Ex. 5. Depress each leg three times for each breath you take. Practise until you can travel in this way the length of an ordinary swimming-bath without getting out of breath, and without any tendency to use muscles other

than those of the hips. Measure your progress by counting the number of beats needed to carry you a given distance. If, with your head in line with your body and your legs pushed well back from the hips, you are unable to prevent them from sinking, support them as on p. 48.

Ex. 11. The stroke

If you have thoroughly practised the foregoing exercises, and can keep your legs at the surface without support, you should have little difficulty in combining the double over-arm with the flutter, and so swimming the crawl. Glide on your face as in Ex. 7, and start with movement two of the right arm. Then begin the flutter. Breathe once every four seconds, or whatever is your normal rate of breathing.

The carriage of the head is dealt with on pp. 35-6. For inspiration turn your head to one side. Never raise it for this purpose, either by bending the neck or by pressure of the off arm. Bending the neck makes it more difficult to turn the head to one side, and unless you are of unusual build you cannot raise your mouth so high by bending your neck as you can by turning your head. Forcing up the head and shoulders by a downward pressure of the arm causes the body to slope down, and checks your speed. It is also inevitably followed by a deep plunge, with further retardation.

As the weight of the arm in the air is many times its weight in water, the body tends to over-balance on to the side on which the arm is raised above the surface for the recovery. To counteract this tendency it is necessary for you to throw your weight on to the opposite side, – the side on which you are pulling. A practised swimmer does this

unconsciously; you, as a beginner, will have at first to roll a little: that is, to turn your whole body over a little towards the side on which you are pulling. The roll should be reduced gradually as you learn to balance yourself, until it is no more than the throwing of the weight on to one side to counterbalance the weight of the recovering arm on the other. The temptation to roll, and so get more time for breathing, is so strong that your aim should be to swim the straight crawl without rolling until you have mastered the stroke. For fast swimming this is essential, since the slightest roll impairs speed in sprinting. In swimming at ease, or for long distances, there is no harm in a slight roll, but it is best to school yourself to swim without a roll, even if you intend to swim only for pleasure.

If there is a roll on to the pulling side, it is essential that it should both begin and end while the pulling arm is in the water. It should not begin until the arm has already begun its downward pressure. At that moment, if the timing of the drill is followed, the other arm is just getting clear of the water. If you begin the roll earlier, it will tend to be exaggerated, since there is no counterbalancing weight; and the pulling arm will enter the water pointing slightly upwards, instead of slightly downwards or horizontally, so that any pressure will tend to force the body backwards.

Whether there is a roll or not, the shoulder should be kept as high as it will go throughout the recovery, so that when the hand enters the water there is, if possible, a slight downward slope from the shoulder to the finger-tips. This downward slope is always possible when there is a roll; also in fast swimming, for the resistance of the water raises the body. In the slow swimming without a roll which you should practise in your acquisition of the crawl stroke it may

not be possible, but whatever happens your arm should never slope up from shoulder to fingers.

Beware of rushing your arm through the air. The natural tendency is to move it too rapidly when the resistance of the water has ceased, and again when the other arm is putting forth its greatest effort. It is a waste of energy to move your arm quickly except during propulsion. Too quick a movement through the air causes the hand to reach the water too soon, and does not give time for the pulling arm to finish its stroke. While the elbow is being bent the hand moves through the air at fair speed, the elbow remaining stationary; the subsequent advance of the arm should be increasingly slow and smooth.

The arm should be perfectly straight from the moment it enters the water to the moment it points down to the bottom. Many swimmers insert it with the elbow bent. If the elbow remains bent throughout the pull there is unnecessary resistance from the water at the beginning, and loss of propelling power in the middle; if it is straightened in the water, the straightening causes still further resistance. It may be thought that time is saved by thus cutting short the stroke, and an equal distance covered more quickly. But this is not so, for this apparently useless part of the movement, when the straight arm is being slowly lowered in the water, follows the main pull of the other arm, so that there is something very like a glide; the forward arm being all but at rest and the body moving on without loss of speed as the result of movement FIVE of the right arm or movement ONE of the left. To cut short the beginning of the stroke by inserting the arm with the elbow bent wastes this glide, and brings no compensating advantage.

It is also essential that the arm should be lowered slowly until it is in a position to make a vigorous movement which

is wholly effective for propulsion. A forcible lowering will do little for propulsion, and what little it does will be more than counterbalanced by the excessive raising of the body (with the resulting plunge and resistance from the water) and by the useless exertion. Once the arm has reached the vertical position, any backward drive or thrust is entirely effective, since the forearm remains vertical till the end of the pull. Moreover a vigorous backward thrust can be made with a bent arm with far less strain on the muscles than when the arm is still straight. Thus rapid movement of the right arm through the water, except towards the end of FOUR and during FIVE and part of SIX, is worse than wasted, since it is of little use for propulsion and forces the body up too high, besides throwing away the glide. The only movement which cannot be made too rapid and forceful in sprinting is FIVE of the right arm and ONE of the left. Arne Borg when sprinting seems to push himself through the water with his elbows owing to his main effort being made during these movements.

The difficulty of moving one arm slowly and the other rapidly at the same time is even greater in swimming than in the land-drill, since the rapid movement has to be vigorous enough to overcome the resistance of the water.

A very common fault is to keep the arm straight after it has passed the vertical, and to force it back and up. This again wastes energy, because the movement is as much upwards as backwards, and because the arm is jerked out, lifting the water and throwing it behind; it also forces the body down in the water. A swift movement with the bent arm, relaxing at the end, is far more effective for propulsion, and brings the arm out of the water smoothly.

The part played by the legs in propulsion is often much overrated. Some swimmers even think that if their arms

alone drive them forty yards a minute, and their legs alone twenty yards a minute, their arms and legs together will send them along at sixty yards a minute. This is a mistake. The speed of a paddle-boat is not increased much, if at all, by affixing a screw to its stern. Actual results in swimming are not easy to obtain, because for various reasons champions who use their legs do not attempt to swim with their arms only. But Bacigalupo, the Italian champion, swims 1,500 metres in a little over 22 minutes (a world's record not so many years ago) without using his legs at all. They sway inertly from side to side, obviously checking his speed, with every stroke of his arms. Presumably a slight muscular movement, just enough to keep his legs in line with his body, would improve his time appreciably without any propulsion. It is probable that with ordinary swimmers propulsion by the legs increases the distance covered in a minute by a few feet at most.

It does not follow that leg-movements are useless, or nearly so. Not only is muscular action necessary to keep the legs from swaying from side to side, but with many swimmers the legs sink unless there is some kind of movement to support them. If the kick is sufficiently effective it no doubt also lessens the strain on the arms.

The most efficient kick is the stride, which converts the crawl into a trudgen; but its retarding effect is so great that the trudgen has almost ceased to be a racing stroke. Next to it come (see Glossary) the scissors and the thrash. The flutter is perhaps less effective by itself than either of these, but it hardly retards at all, however fast the body is driven with the arms, and it is therefore the ideal leg-action for speed. It is certainly the only one suitable for sprinting.

Even the flutter has some retarding effect if the opening is wide enough. For sprinting the recent tendency towards

a greater number of beats with a narrower opening is to this extent justified. The faster the pace, the greater the resistance of the water and the need for a narrow opening. The difference in propulsion is negligible.

Detailed descriptions of the scissors and the thrash are not printed here because both movements are difficult to perform correctly, and it seems doubtful whether either is worth the trouble of acquisition. The scissors movement is more often seen than the flutter, and is not seldom performed in such a way that if used alone it would send the swimmer backwards. A narrow scissors has not much more propelling effect than a flutter; a wide one necessitates a roll, and produces a stroke which is something between a crawl and a trudgen. The thrash, which was the earliest form of leg-action in the crawl, is now less popular than the scissors. It is an effective movement for keeping up the legs, but is incompatible with a horizontal position unless the feet are raised above the surface.

If you cannot keep up your legs with the flutter while crawling at one stroke in four seconds, see (1) that you are not bending them downwards at the hip in any part of the movement; (2) that your head is held in line with your body all the time; (3) that you are not pressing down too hard at the beginning of the stroke, and so lifting the upper part of your body and forcing your legs down; and (4) that, if the body rolls, the legs roll with it. If your legs still sink, it is best not to attempt the crawl till you have an opportunity of practising in salt water. Once you have acquired a correct stroke, and made a habit of it, you can increase your speed, and may then be able to keep up your legs in fresh water.

DON'TS AND WHYS IN THE CRAWL

1. Don't hold your breath, unless water enters your mouth just when inhalation is due. Continuous breathing in and out is essential for a proper supply of oxygen to the blood, and any interruption causes temporary weakness.
2. Don't breathe in through your nose. If you do, you cannot prevent water from entering your windpipe and choking you.
3. Don't swallow air. It causes pressure on the heart and breathlessness.
4. Don't stop if you get out of breath. Slow down instead.
5. Don't lift your head to breathe. It sinks you and stops your way, and does not make breathing easier.
6. Don't slope your head downwards. This also tends to sink you and stop your way.
7. Don't fail to straighten your arm before it enters the water. A bent arm increases resistance, and gains nothing.
8. Don't bend wrist or fingers before inserting the hand, as this causes resistance. After insertion they may be bent downwards a little, but they should be straightened again for the main part of the drive.
9. Don't swerve to right or left from the straight course in inserting your hand. It should enter the water directly in front of your shoulder. To deviate from this line makes your course uneven and your steering uncertain, and stops your way.
10. Don't press downwards in the early part of the pull. You do not help propulsion by doing so, and you raise your body too much, causing it to rise and sink alternately and impairing speed.

11. Don't apply force suddenly at any time. You will waste energy without increasing speed.

12. Don't bend your elbow till your arm is vertical. You will weaken your stroke without appreciably saving your strength.

✓13. Don't keep your arm straight after it has passed the perpendicular. You will waste energy and force your body downwards.

14. Don't turn your palm sideways. It makes the pull less effective.

15. Don't fail to relax your muscles while lifting your arm from the water. They need rest.

16. Don't rush the recovery. To do so wastes energy and upsets the timing of your stroke and therefore your breathing.

17. Don't move the upper part of your arm during the recovery until your hand points forward. Sweeping round the outstretched arm over the water upsets your balance, and is tiring.

18. Don't strike the surface of the water during the recovery, but don't raise either hand or elbow more than is necessary to clear it. The first checks your progress; the second wastes energy and upsets your balance.

19. Don't roll, if you roll at all, on to the side on which you are pulling, till the pull has begun. If you do so, your arm will slope upwards from the shoulder, and the beginning of the pull will retard you.

20. Don't roll more than is necessary for the leg-opening. It checks your speed, especially in fast swimming.

21. Don't either arch or hollow your back; keep it straight. Both arching and hollowing interfere with speed, and the latter with breathing also. Keep your legs up by a

step-back movement from the hips, not by hollowing the back.

22. Don't bend at the hips, except backwards, – that is, upwards. The least downward bend retards you.

23. Don't, in the straight crawl, use the muscles of your knees or ankles, either for bending or for straightening. Leave your knees and ankles free play, and the water will do all that is needed.

24. Don't part your legs except in the direction of the heel and toe. It weakens the propelling effect of the closure.

25. Don't present the arch of your instep to the water, but the flat part between the arch and the outer edge of the foot. The flat surface is more useful, both for keeping up the legs and for propulsion.

When you have acquired a fault it is often useful to cultivate for a time the opposite fault until your habit is counteracted. For instance, if in the crawl you find it difficult to get yourself out of the habit of inserting your hand in the water outside the line of the shoulder (instead of directly in front) try inserting it a little inside the line until the habit is broken.

CHAPTER VI

✓ THE SIDE-STROKE

THE side-stroke was the fastest stroke known before the invention of the trudgen, but is no longer seen in first-class competitions. It is complicated, but has no difficulties comparable with those of the crawl. It is the most graceful of all strokes, and most people who swim for pleasure find it combines comfort with speed better than any other. Breathing and observation are easy, and it is not necessary to breathe out under water. Propulsion is mainly with the legs, where the strength of most ordinary people lies, but enough use is made of the arms to give them gentle and pleasant exercise. A glide gives rest without diminution of speed. The chief drawback is the resistance offered by the water to the recovery of both arms and legs, especially the former, but this can be diminished by recovering one arm above the surface.

Ex. 1. Arm-action, by numbers

When swimming you will lie on your side. In this drill you stand erect. The movements are otherwise exactly similar. You must imagine the water to be on one side of you, the air on the other. (But see p. 31.) There are great advantages (see p. 36) in being able to swim with equal ease on either side. The exercises for swimming on the right side should not, therefore, be practised more than those for swimming on the left side. For the meaning of "near," "off," and "upper" in this and the following exercises see the Glossary.

*(a) Lying on right side**Near (left) arm*

POSITION – READY. Standing erect¹ with feet together, raise your left arm, slightly bent at the elbow, to the front, forearm and hand vertical, fingers closed, palm right, till your elbow is level with your mouth.

ONE. Turning your body above the waist half-right, straighten your arm upwards, and sweep it down, unbent, directly to the right of your original position until it is palm-down and horizontal.

TWO. Turning your body front again, and keeping your forearm and hand horizontal, move your elbow to your left side. Then drop your forearm and hand, knuckles front.

THREE. Without moving your upper arm, lift your hand, keeping it close to your body, knuckles front, as high as your chest.

FOUR. Return your arm to its original position by raising your elbow and forearm together.

Off (right) arm

POSITION – READY. Extend your right arm to the right, palm down and horizontal, fingers closed, hand in line with forearm.

ONE. Turning your body above the waist half-right, move your elbow obliquely towards your back, and at the same time bring in your hand, without lowering it, towards your chest, pointing upward, palm front.

TWO. Turning your body front again, stretch your arm up to its full length, palm front.

THREE. Turn your palm right. Maintain your arm in the same position.

¹ For the meaning of this see p. 57.

PLATE III
SIDE-STROKE DRILL

Lying on right side.

The position shown is that with which the movement ends. Thus ONE is the position reached at the end of movement ONE, and FOUR is the READY position.



FOUR. Sweep your outstretched arm down to its original position.

Both arms

POSITION – READY. Left arm up, right horizontal.

ONE. Turn half-right, straighten left arm and sweep down to right, and bring in right arm.

TWO. Turn front, complete downward movement of left arm, and straighten right arm upwards.

THREE. Raise left hand to chest, and turn right palm to right.

FOUR. Left arm up, right horizontal.

(b) Lying on left side

Near (right) arm

POSITION – READY. Standing erect with feet together, raise your right arm, slightly bent at the elbow, to the front, forearm and hand vertical, fingers closed, palm left, till your elbow is level with your mouth.

ONE. Turning your body above the waist half-left, straighten your arm upwards and sweep it down, unbent, directly to the left of your original position till it is palm-down and horizontal.

TWO. Turning your body front again, and keeping your forearm and hand horizontal, move your elbow to your right side. Then drop your forearm and hand, knuckles front.

THREE. Without moving your upper arm, lift your hand, keeping it close to your body, knuckles front, as high as your chest.

FOUR. Return your arm to its original position by raising your elbow and forearm together.

Off (left) arm

POSITION – READY. Extend your left arm to the left,

palm-down and horizontal, fingers closed, hand in line with forearm.

ONE. Turning your body above the waist half-left, move your elbow obliquely towards your back, and at the same time bring in your hand, without lowering it, towards your chest, pointing upward, palm front.

TWO. Turning your body front again, stretch your arm up to its full length, palm front.

THREE. Turn your palm left.

FOUR. Sweep your outstretched arm down to its original position.

Both arms

POSITION – READY. Right arm up, left horizontal.

ONE. Turn half-left, straighten right arm and sweep down to left, and bring in left arm.

TWO. Turn front, complete downward movement of right arm, and straighten left arm upwards.

THREE. Raise right hand to chest, and turn left palm to left.

FOUR. Right arm up, left horizontal.

Ex. 2. Arm-action, without numbers

Practise the movements in the last exercise with both arms. The action should be continuous except after the completion of THREE and before beginning FOUR. Pause at this point, when one arm is vertical and the other at your chest, until about four seconds (or whatever is the time you take over each ordinary breath) have elapsed since you were last in this position. In other words, each complete cycle of the arms, including the pause, should last as long as you usually take to breathe in and out once.

The exact moment of breathing is of less importance in

the side-stroke than in the breast-stroke and the crawl, as your mouth will be for most of the time above water, so that you do not have to wait a whole cycle if you miss the right moment. I have therefore not thought it necessary to add breathing to the already complicated drill by numbers. But it is desirable that you should breathe in at the same point in each cycle when swimming, and for the reasons given on p. 91 the best point is the middle of movement THREE. Introduce breathing at this point as soon as you have become fairly proficient in the drill without numbers.

Ex. 3. The stride

The stride is the leg-action of the side-stroke and trudgen. In the side-stroke it is performed during arm-movements TWO and THREE in Ex. 1.

Lying on right side

POSITION – READY. Lie on your right side on a bed or mattress, your right arm outstretched and in line with your body, palm down; your head resting on that arm; your left upper arm lying along your side, elbow sharply bent, hand on chest; your legs together, one over the other, toes pointed.

OPEN. (Movement TWO and first part of THREE in Ex. 1.) Slowly move your right leg back along the bed as far as it will go, and bend the knee as much as you can, leaving the ankle-muscles completely relaxed, so that the ankle also is bent. At the same time slowly move your left leg forward along the bed, bending the knee as little as possible and relaxing the ankle-muscles so that the toes are pointed. (Do not move it too far forward, as this will prevent the other leg going back as far as it should. To get the correct position, first move the right leg back as far as possible, and

then the left forward as far as possible.) At the same time straighten your left arm so that it lies along your side, and then, keeping the upper arm still, slowly move the hand close along your body half-way to your chest.

CLOSE. (Second part of THREE in Ex. 1.) Smartly return both legs to their original position, so that both get into place simultaneously. Keep the toes of the left foot pointed all the time by using the ankle-muscles, but relax the muscles of the right ankle. At the same time slowly complete the movement of the left hand along the body to the chest, till it is in its original position.

Lying on left side

POSITION – READY. Lie on your left side on a bed or mattress, your left arm outstretched and in line with your body, palm down; your head resting on that arm; your right upper arm by your side, elbow sharply bent, hand on chest; your legs together, one over the other, toes pointed.

✓ OPEN. (Movement TWO and first part of THREE in Ex. 1.) Slowly move your left leg back along the bed as far as it will go, and bend the knee as much as you can, leaving the ankle-muscles completely relaxed, so that the ankle also is bent. At the same time slowly move your right leg forward along the bed, bending the knee as little as possible and relaxing the ankle-muscles so that the toes are pointed. (Do not move it too far forward, as this will prevent the other leg going back as far as it should. To get the correct position, first move the left leg back as far as possible, and then the right forward as far as possible.) At the same time straighten your right arm so that it lies along your side, and then, keeping the upper arm still, slowly move your hand close along your body half-way to your chest.

CLOSE. (Second part of THREE in Ex. 1.) Smartly

return both legs[↑] to their original position, so that both get into place simultaneously. Keep the toes of the right foot pointed all the time by using the ankle-muscles, but relax the muscles of the left ankle. At the same time slowly complete the movement of the right hand along the body to the chest, till it is in the original position.

The object of the slight arm-movement is to facilitate the co-ordination of arms and legs (in other words the timing of the kick), when you come to swim the stroke. The straightening of the near arm is not a movement actually made in swimming, but is necessary here in order to get the arm into the proper position, and differs little from the latter part of movement TWO of the same arm in Ex. 1.

You will find it difficult at first to move your legs vigorously and your hand slowly at the same time. To school you into doing so is one of the objects of this exercise. If you do not learn it on land you are not likely to learn it in the water.

Now perform the above movements continuously, pausing after the closure so that the whole cycle lasts about four seconds, or as long as you usually take to breathe in and out once. Practise them on each side alternately, so that you are equally at your ease on whichever side you lie.

Ex. 4. Arm-action, in water

/ Glide on your right side as in Ex. 22, p. 24. Bring your left hand to your chest as in movement THREE of the drill, and continue with both arms as in FOUR, ONE, etc. Breathe in from the middle of movement THREE, and glide after completing THREE and before beginning FOUR, so that the cycle lasts four seconds, or whatever time you take over an ordinary breath.

If you have practised the drill thoroughly, you are not likely to have any difficulty in substituting a more or less horizontal for a vertical position; but in case you have any such difficulty I give the substituted drill below.

THREE. Left elbow at side, left hand at chest, right arm stretched forward.

FOUR. Left elbow opposite mouth, left forearm pointing forward, right arm pointing straight to bottom.

ONE. Body turned half-right, left arm pointing straight to bottom, right arm under body and bent almost double.

TWO. Body on side, left arm back, right arm stretched forward.

If your legs sink, use an artificial support as described on p. 48.

Now glide on your left side, bring your right hand to your chest, and perform similar movements, as below.

THREE. Right elbow at side, right hand at chest, left arm stretched forward.

FOUR. Right elbow opposite mouth, right forearm pointing forward, left arm pointing to bottom.

ONE. Body turned half-left, right arm pointing to bottom, left arm under body.

TWO. Body on side, right arm back, left arm stretched forward.

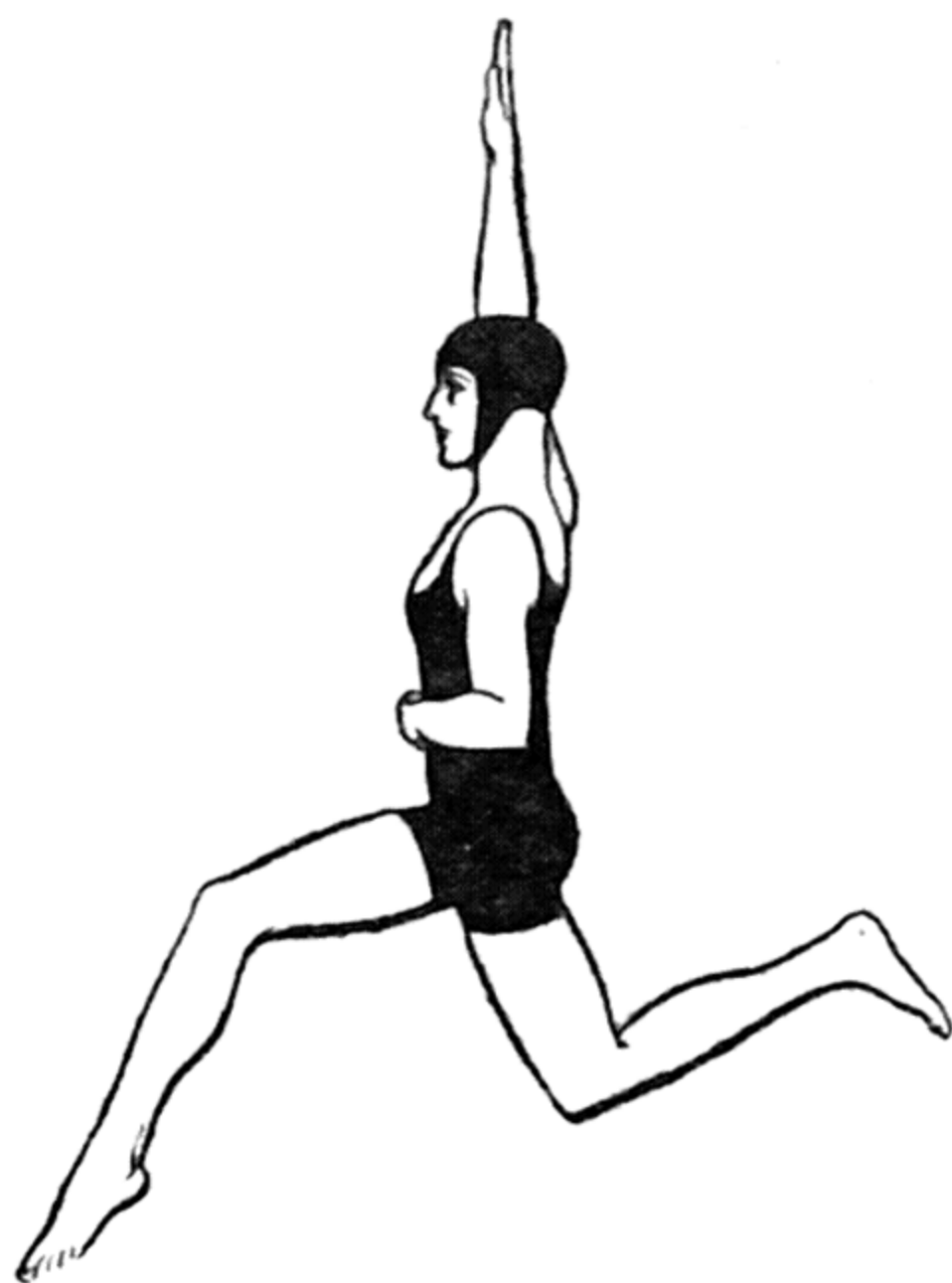
✓ Practise till you can swim with equal ease on either side. Follow carefully the instructions in Ex. 22, p. 25, regarding the poise of the body.

Ex. 5. The stride, in water

Glide on your side as in the last exercise, one arm outstretched and the other at your chest. Practise the movements of the stride as in Ex. 3, first with each leg separately

and then with both together. Glide between the strokes so that the whole cycle lasts about four seconds, or as long as you take to breathe in and out once.

The movement with both legs should send you straight forward. If it does not do so, there is something wrong, and you should try to find out what it is. Your head may be to one side, or your arm not in line with your body, or your under thigh not drawn back.



READY TO KICK

The legs should at no time be parted vertically. They should, on the contrary, be slightly crossed, but should open mainly in the direction of heel and toe. In the opening the under foot should be raised a little, so as to be directly behind the other; in the closure it should be lowered a little to its place below the upper foot.

Practise till you can swim with equal ease on either side. Follow carefully the instructions in Ex. 22, p. 25, regarding the poise of the body.

The illustration shows the position of the legs at their widest.

Ex. 6. The stroke

Glide on your right side as in Ex. 4, and move your left hand to your chest as in THREE. Continue with the arms as in FOUR, ONE, etc. After ONE, when your left arm points to the bottom, begin to open the legs for the stride (Exs. 3 and 5), and close them during the latter part of THREE, so that they come together just as your left hand reaches your chest. Glide, with the right arm forward and the left at your chest, till four seconds, or whatever time you usually take to breathe in and out, have elapsed since you began the arm-movements in FOUR. Then continue as in FOUR, etc. Keep your legs together, toes pointed, after the closure till you again begin two.

Now glide on your left side, move your right hand to your chest, and continue as in Exs. 4 and 5, lying on your left side. Practise till you can swim with equal ease on either side.

Each arm should point straight ahead at the beginning of its pull, and should be pressed straight down in the water. The half-turn of the body is made to facilitate the direct action of the near arm.

As in the crawl (see pp. 74-5) the lowering of the arm in the water should begin very slowly, the speed increasing till the arm points to the bottom. The most vigorous part of the arm-action should be the backward drive of the near forearm in two, and of the off upper arm in ONE; but the near-arm muscles should begin to relax in TWO as soon as your elbow reaches your side, and should be completely relaxed at the end of two.

Whether your mouth goes under the surface or not will depend on your buoyancy and build, but in any case it is best to breathe as in the crawl and breast-stroke, - in through the mouth and out through nose or mouth or both.

It is desirable to keep the body at as uniform a height in the water as possible, and therefore to breathe in, if this can be done, a little before the movements of the limbs give it least support. Such a moment occurs during the closure of the legs. An inspiration taken then will prevent the body from sinking unduly during the glide and before the pull of the off arm begins to support it. But this is not the easiest time to breathe in. The easiest time is when the downward pressure of the off arm has begun to raise the body. An additional advantage of breathing in during the leg-closure is that if inspiration is made impossible then (by a wave, for instance) you can still take breath during the glide or during the downward movement of the off arm.

The glide compensates for the retardation caused by the wide opening of the legs, and should not be omitted. Without it much of the effect of the powerful kick is wasted; the off-arm pull, already short, immediately follows the kick, and thus becomes almost ineffective; and the resistance of the water to the recovery of the near arm is increased. The glide gives you a rest without any loss of speed, decreases resistance, and enables the off arm to do its proper share of work.

As the recovery of the arms is entirely under water, it is important that the resistance of the water should be eliminated as much as it can be by pointing the fingers and thumbs of both hands straight ahead from the beginning to the end of the recovery, and by bringing the near arm forward as close as possible to the body. If the fingers are bent, or not pointed straight ahead, or if the near arm is brought forward away from the body, you may not feel the resistance of the water much when you are going slowly (as you should when practising the stroke), but it will make all the difference when you come to increase your speed.

Nos. 1-4, 7, 8, 10-14, and 24 of the 'Don'ts' at the end of the chapter on the crawl (pp. 78-80) apply to the side-stroke also.

The single over-arm is a variety of the side-stroke. In it the near arm is recovered through the air instead of through the water. I have not dealt with it separately, for the following reasons.

1. A recovery under water is easier for a beginner than one in air, which tends to upset his balance and to sink his mouth below the surface.

2. The details of the recovery of the near arm through the air are given in the trudgen drill, and can easily be adopted by anyone who wants to learn the single over-arm. Let the arm drift during movement THREE of the side-stroke, and bend the elbow during the ensuing glide as in movement THREE of the trudgen. The arm can then be moved forward through the air as in FOUR of the trudgen.

CHAPTER VII

THE TRUDGEN

THE trudgen is so called after a swimmer named J. Trudgen who had learnt in South America to recover both arms in the air, a practice apparently not yet adopted by European swimmers sixty years ago, though common enough in other parts of the world. As now swum it is the most complicated of all swimming-strokes, and the only one which makes the fullest use of both arms and legs. It combines the stride with the arm-action of the crawl, modified owing to the body lying for part of the time on its side, – the only position in which the stride is possible. It ranks next to the crawl in speed, and is still used by some swimmers for the longer distances in first-class competitions. Over the side-stroke it has the great advantage, shared with the crawl, that the water offers no resistance to the recovery of the arms. Over the crawl it has the advantages, shared with the side-stroke, that breathing is easier, that a better view is obtained of the surroundings, and that full use is made of the powerful muscles of the legs. But the face is under water for about a third of the time, and the resistance of the water to the recovery of the legs makes the trudgen inferior to the crawl in speed.

Ex. 1. Arm-action, by numbers

When swimming you will lie for about half the time on your side and for the other half on your face. In this drill you stand erect. The movements are otherwise similar. In the **READY** position you must imagine the water to be in

front of you, and the air behind you. (But see p. 31.) As in the side-stroke, you should learn to swim on either side with equal ease. For the meaning of 'near,' 'off,' and 'upper' in this and the following exercises see the Glossary.

(a) Lying on right side

Near (left) arm

POSITION – READY. Stand with head and trunk erect,¹ feet together, legs straight and drawn back a little from the hips.² Extend your left arm horizontally in front of you, palm down, fingers and thumb together and pointing front.

ONE. Turn left, and at the same time, keeping your forearm and hand horizontal, bring your elbow to your left hip, forearm pointing right.³

TWO. Move your elbow to the left till it is a few inches (say a twelfth of your height) from your body, forearm and hand hanging limp, palm right.

THREE. Without moving your upper arm, straighten your hand and raise it forwards, by bending the elbow, till your forearm and hand point upwards, palm right.

FOUR. Move your elbow up till it is a few inches (say a twelfth of your height) to the left of your head, forearm inclined a little to the right, palm right.

FIVE. Turn right, and at the same time straighten your arm upwards, palm front.³

SIX. Move your arm directly forwards and slightly downwards till it makes an angle of 15° with the vertical.

SEVEN. Move your arm directly forwards and downwards till it makes an angle of 45° with the vertical.

EIGHT. Continue the downward sweep till your arm is in the original position.

¹ See p. 57.

² See pp. 56–7.

³ Towards the same point of the compass as before the turn.

PLATE IV
TRUDGEN DRILL

Lying on right side.

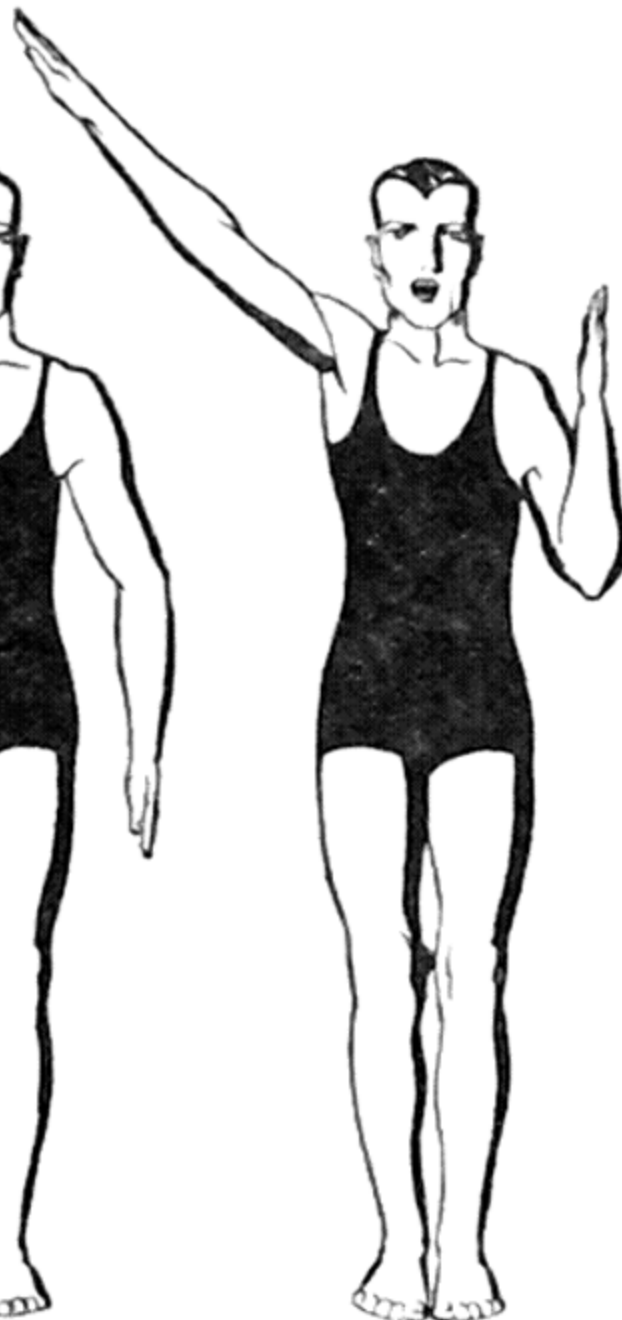
The position shown is that with which the movement ends. Thus ONE is the position at the end of movement ONE, and EIGHT is the READY position.



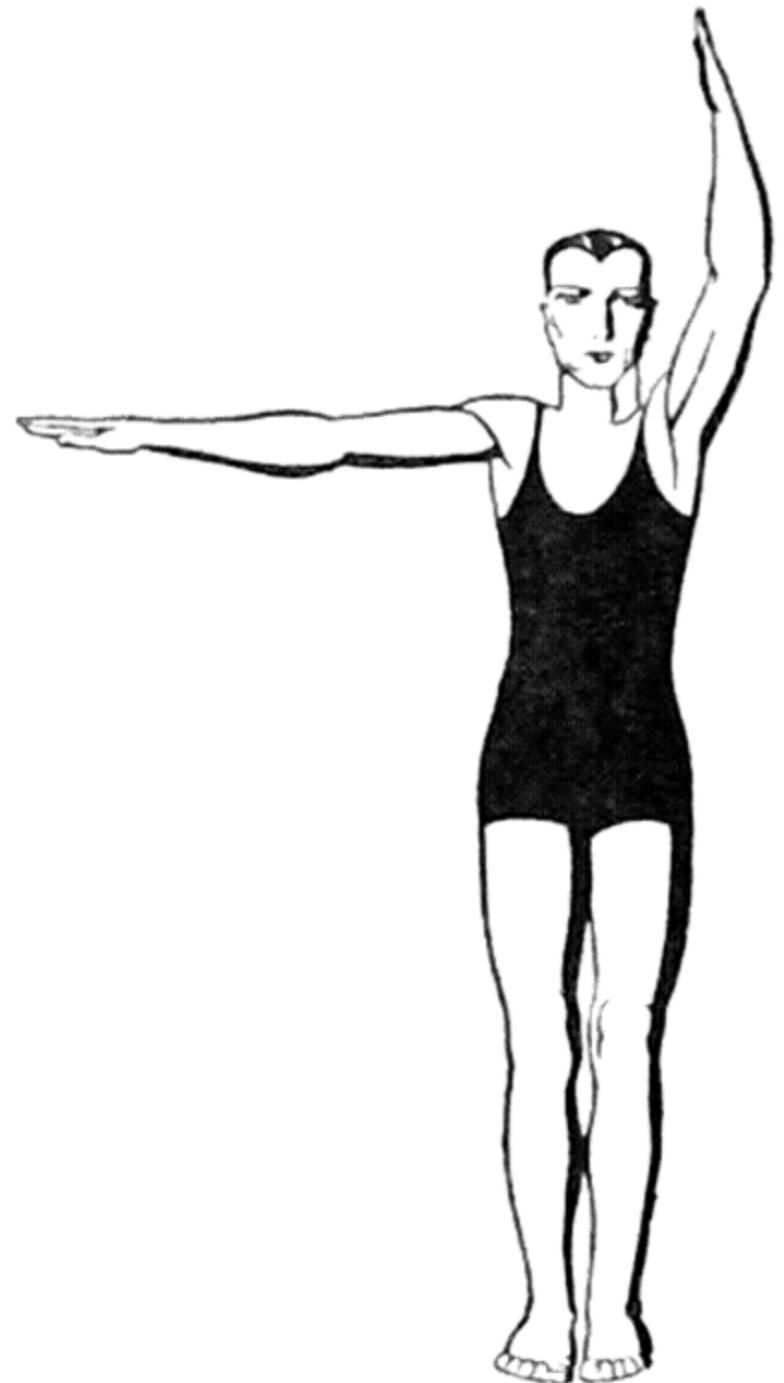
ONE



TWO



THREE



FOUR



FIVE



SIX



SEVEN



EIGHT

Off (right) arm

POSITION – READY. Stand as before. Keeping your chest square to the front, but moving back your right shoulder, stretch your right arm upwards, elbow well back and a few inches (say a twelfth of your height) to the right of your head, forearm inclined a little to the left and slightly forwards, hand in line with forearm, fingers and thumb together, palm front.

ONE. Turn left, and at the same time straighten your arm upwards, palm right.¹

TWO. Move your arm, without bending it, slightly down to the right, till it makes an angle of 15° with the vertical.

THREE. Move your arm further down to the right till it makes an angle of 45° with the vertical.

FOUR. Continue the downward sweep till your arm is horizontal and pointing to the right, palm down.

FIVE. Turn right, and at the same time, keeping your forearm and hand horizontal, bring in your elbow to your side, forearm pointing to the front.¹

SIX. Move your elbow back and out from your body. At the same time drop your forearm and let it hang limp, palm front.

SEVEN. Without moving your upper arm, straighten your hand and raise it to the right, by bending the elbow, till your forearm and hand point upwards and slightly forwards, palm front.

EIGHT. Move your whole arm up into its original position.

Both arms

POSITION – READY. Stand as before, right arm raised, left horizontal to front.

¹ Towards the same point of the compass as before the turn.

ONE. Turn left, straighten your right arm upwards, and bring your left elbow to your hip, forearm pointing right.

TWO. Right arm at 15° , left down.

THREE. Right arm at 45° , left elbow sharply bent.

FOUR. Right arm horizontal to right, left raised.

FIVE. Turn right, right elbow at side, left arm straight up.

SIX. Right arm dropped, left at 15° .

SEVEN. Right elbow sharply bent, left arm at 45° .

EIGHT. Right arm raised, left horizontal.

(b) Lying on left side

Near (right) arm

POSITION – READY. Stand as before. Extend your right arm horizontally in front of you, palm down, fingers and thumb together and pointing front.

ONE. Turn right, and at the same time, keeping your forearm and hand horizontal, bring your elbow to your right hip, forearm pointing left.¹

TWO. Move your elbow to the right till it is a few inches (say a twelfth of your height) from your body, forearm and hand hanging limp, palm left.

THREE. Without moving your upper arm, straighten your hand and raise it forwards, by bending the elbow, till your forearm and hand point upwards, palm left.

FOUR. Move your elbow up till it is a few inches (say a twelfth of your height) to the right of your head, forearm inclined a little to the left, palm left.

FIVE. Turn left, and at the same time straighten your arm upwards, palm front.¹

SIX. Move your arm directly forwards and slightly downwards till it makes an angle of 15° with the vertical.

¹ Towards the same point of the compass as before the turn.

SEVEN. Move your arm directly forwards and downwards till it makes an angle of 45° with the vertical.

EIGHT. Continue the downward sweep till your arm is in the original position.

Off (left) arm

POSITION – READY. Stand as before. Keeping your chest square to the front, but moving back your left shoulder, stretch your left arm upwards, elbow well back and a few inches (say a twelfth of your height) to the left of your head, forearm inclined a little to the right and slightly forwards, hand in line with forearm, fingers and thumb together, palm front.

ONE. Turn right, and at the same time straighten your arm upwards, palm left.

TWO. Move your arm, without bending it, slightly down to the left, till it makes an angle of 15° with the vertical.

THREE. Move your arm further down to the left till it makes an angle of 45° with the vertical.

FOUR. Continue the downward sweep till your arm is horizontal and pointing to the left, palm down.

FIVE. Turn left, and at the same time, keeping your forearm and hand horizontal, bring in your elbow to your side, forearm pointing to the front.¹

SIX. Move your elbow back and out from your body. At the same time drop your forearm and let it hang limp, palm front.

SEVEN. Without moving your upper arm, straighten your hand and raise it to the left, by bending the elbow, till your forearm and hand point upwards and slightly forwards, palm front.

EIGHT. Move your whole arm up into its original position.

¹ Towards the same point of the compass as before the turn.

Both arms

POSITION – READY. Stand as before, left arm raised, right horizontal to front.

ONE. Turn right, straighten your left arm upwards, and bring your right elbow to your hip, forearm pointing left.

TWO. Left arm at 15° , right down.

THREE. Left arm at 45° , right elbow sharply bent.

FOUR. Left arm horizontal to left, right raised.

FIVE. Turn left, left elbow at side, right arm straight up.

SIX. Left arm dropped, right at 15° .

SEVEN. Left elbow sharply bent, right arm at 45° .

EIGHT. Left arm raised, right horizontal.

At the READY and the end of movements SEVEN and EIGHT of your off arm your hand should be about a twenty-fourth of your height (three inches in a tall man) in advance of your elbow. At the end of movement SIX of your off arm your elbow should be as far back and as close in laterally as is compatible with the position at the end of movement SEVEN.

The muscles of the near arm and hand should relax during movement TWO, and become firm again, but not too firm, during movement FIVE.

As soon as you are able to do these eight movements with a fair degree of accuracy, one arm at a time, within four seconds, you should begin breathing as you will have to breathe in swimming. Breathe in through the mouth during movements TWO and THREE, and out through the nose during the rest of the time.

Ex. 2. Arm-action, without numbers

Practise the movements in the last exercise with both arms simultaneously in one smooth continuous action, one

cycle in four seconds, or whatever time you usually take to breathe in and out. Take care to keep to the correct timing, to slacken your muscles at the right moments, and to breathe in through the mouth during movements TWO and THREE. If there is any tendency to get out of time, or to do the movements wrongly, practise again by numbers, each arm separately.

Ex. 3. Arm-action, in water

Stand with your back to the side of a swimming-bath, about waist-deep. Raise your arms so that they are vertical, and parallel to each other on each side of your head. Bend down, your head still between your arms, and glide as in Ex. 13, p. 16, breathing out gently. Your arms are now floating ahead of you and parallel to each other. Go through the arm-action of the trudgen as in the last exercise, but with your body free in the water. Begin with movement SIX of the near (left) arm (see drill, lying on right side), and continue through SEVEN and EIGHT, with your right arm still forward. Then turn on to your right side, bring your left elbow to your left hip, as in ONE, and turn your right hand so that it is still palm down. Continue with both arms as in TWO, THREE, and so on. If your legs sink, use an artificial support as recommended on p. 48.

Now start again as above, but begin with movement SIX of the near (right) arm (see drill, lying on left side), and continue through SEVEN and EIGHT, with your left arm still forward. Then turn on to your left side, bring your right elbow to your right hip, as in ONE, and turn your left hand so that it is still palm down. Continue with both arms as in TWO, THREE, and so on.

Breathe once in four seconds, or at whatever rate you normally breathe, and take ten strokes on your right side,

ten on your left, and so on. Practise till you can swim with equal ease on either side.

Ex. 4. The stroke

Glide on your face and use your arms as in Ex. 3. As you turn on your side (in ONE), begin to open your legs slowly for the stride. See Chap. VI, Ex. 3 and 5, pp. 85 and 88. Continue to open them throughout TWO, and close them forcibly during THREE. Keep them together, toes pointed, till you again begin ONE.

Breathe once in four seconds, or at whatever rate you normally breathe, and practise till you can swim with equal ease on either side.

As in the crawl and side-stroke, the lowering of the arm in the water should begin very slowly, the speed increasing till the arm points to the bottom. The most vigorous part of the action should be the drive of the near forearm in ONE, and of the off arm in the first part of FIVE. The near arm in TWO and the off arm in SIX should be relaxed.

Nos. 1-4, 6-18, and 24 of the 'Don'ts' at the end of the chapter on the crawl (pp. 78-80) apply to the trudgen also.

Some swimmers prefer a later closure of the legs, as the body turns on to its face in movement FIVE.

CHAPTER VIII

✓ THE BACK STROKES

THE back crawl is the fastest stroke on the back, and the only one now used in first-class back-stroke racing. Recent times are better than the records of a generation ago for all kinds of stroke, face and back. High speed can be attained without sinking the face below water. As in the crawl, propulsion is mainly by the arms, and adults with weak arms will do better to adopt another stroke for swimming on the back. Great suppleness is needed for a perfect stroke.

Ex. 1. Arm-action of the back crawl, by numbers

(a) Right arm

POSITION – READY. Stand with your head erect or slightly forward, and your arms by your sides.

ONE. Turn your right arm and hand together, keeping the thumb near your thigh as you do so, so that the palm faces right. Letting your forearm and hand hang limp, move your elbow forwards and upwards till your upper arm is horizontal.

TWO. Raise your elbow as far as it will go, your forearm and hand still hanging down. Then straighten your arm and hand upwards to the vertical, fingers and thumb together, your palm still facing right.

THREE. Move your arm, without bending it, back and down till it is horizontal, your palm facing all the time in the direction in which your hand is moving. If you cannot

move your arm directly backwards without strain, let it go a little to the right.

FOUR. Bring your arm to your side, still without bending it, and still facing your palm in the direction in which your hand is moving.

Left arm

POSITION – READY. Stand as before, your right arm hanging by your side, your left arm and hand straight and pointing up, fingers and thumb together, palm outwards.

ONE. Move your arm, without bending it, back and down till it is horizontal, your palm facing all the time in the direction in which your hand is moving. If you cannot move your arm directly backwards without strain, let it go a little to the left, as in Plate V.

TWO. Bring your arm to your side, still without bending it, and still facing your palm in the direction in which your hand is moving.

THREE. Turn your arm and hand together, keeping the thumb near your thigh, so that the palm faces left. Letting your forearm and hand hang limp, move your elbow forwards and upwards till your upper arm is horizontal.

FOUR. Raise your elbow as far as it will go, your forearm and hand still hanging down. Then straighten your arm and hand upwards to the vertical, fingers and thumb together, your palm still facing left.

Both arms

POSITION – READY. As for left arm.

ONE. Right elbow forward, left arm horizontal.

TWO. Right arm straight up, left at side.

THREE. Right arm horizontal, left elbow forward.

FOUR. Right arm at side, left straight up.

PLATE V

BACK CRAWL DRILL



END OF ONE



MIDDLE OF TWO



END OF FOUR

In **THREE** of the right arm and **ONE** of the left your hand should be sloped not only laterally, but from wrist to finger-tips. The wrist should therefore be bent inwards (that is, towards the pulse) at the beginning of the stroke, straightened gradually as the arm reaches the horizontal, and bent outwards (or back) gradually till the arm is at the side.

Ex. 2. Arm-action of the back crawl, without numbers

Practise the movements in Ex. 1 with both arms in one smooth, slow, continuous action. If there is any tendency to do them wrongly, practise again by numbers. Breathe in through the mouth during movement **THREE**.

Observe that whereas in the crawl recovery the hand goes up (forward in swimming) first, and is followed by the elbow, in the back-crawl recovery the elbow goes up (forward in swimming) first, and is followed by the hand.

Ex. 3. The back crawl

Float on your back as in Ex. 18, p. 21, and put your arms in motion as in the drill in Ex. 1, p. 101. Let your legs trail if they will keep up. If not, support them with floats as recommended on p. 48. When the arm-stroke has been thoroughly practised, add the flutter (Ex. 8, p. 67).

Breathing presents no difficulty in smooth water, but should be regular. The inspiration is best made at the early part of the recovery of one of the arms.

Raising an arm in the air tends to make you roll over to the side of that arm, and the tendency must be counteracted by a roll to the opposite side. The roll also makes it easier to deepen the drive of the pulling arm and so make it more effective; but it should be

restrained, and it should be gradually reduced as you find it easier to balance your body and to drive your arm towards the bottom. The greater your suppleness, the less will you find it necessary to roll.

The body should lie as flat in the water as is possible without strain. If, with your hip-joints straight, your feet tend to come out of the water, raise your head; if your legs sink, lower it. If you want not speed but comfort, especially in rough water, carry your head high; not by bending your neck so as to strain it, but by sloping your back a little. A raised head is, of course, convenient for both breathing and observation.

The backward bend at the hips, which is so essential a part of the leg-action if you crawl on your face, is unnecessary here, and indeed has a retarding effect, as it lowers the legs too much. The knee should at least reach the surface, so that when the leg is up there is a slight upward bend at the hip.

/The back crawl has proved so clearly its superiority for racing purposes to other back strokes that it is unnecessary for any one to practise what used to be called the back racing-stroke, in which the arms are flung through the air simultaneously in advance of the head. This stroke only attains speed at the cost of sinking the head under water; which, when you are on your back, is very unpleasant, and is altogether unnecessary.

Apart from the back crawl, you are only likely to swim on your back as a way of resting yourself. The best stroke for this purpose, if you have been throwing much work on your arms, is the sole-kick on the back, which you learnt

in Ex. 5 on p. 44; the arms being allowed to drift at your sides and so given complete rest.

There is, however, an arm-action on the back which is easy, pleasant, and effective, and may be used to rest the legs or in combination with the sole-kick. The land-drill is given below.

Ex. 4. Another back arm-stroke

By numbers

POSITION – READY. Lie on your back on a bed or mattress, arms at sides, knuckles up, fingers and thumb together in each hand.

ONE. Without moving your upper arms, bring your hands, very slowly, close along the front of your body till your forearms and hands point in the direction of your head, knuckles to each side.

TWO. Straighten your arms along the bed past your head, spreading them till your hands are half your height apart. As you do so, turn your hands so that the palms face outward on each side.

THREE. Smartly move your arms, unbent, along the bed to their original position.

Without numbers

Practise the above movements without numbers smoothly and continuously except for a pause at the end of THREE. Breathe in during movement ONE.

The same movements should then be practised in water. The arms should be kept just beneath the surface the whole time, and the hips well raised.

If this arm-action is used with the sole-kick, the recovery of arms and legs should be simultaneous. This allows for

a long glide, which is lost if the arms recover during the kick and the legs during the arm-pull.

Sculling is another way of propelling oneself on the back. It is less easy to acquire, and needs strong wrists to make it effective. The movement is continuous, and may be used either by itself or in conjunction with one of the kicks. The land-drill is given below.

Ex. 5. Sculling

By numbers

POSITION – READY. Standing or sitting. Let your arms hang at your sides, elbows very slightly bent so that your hands come forward a little, fingers closed and pointing to the front, palms down but turned slightly outwards as in Ex. 16, p. 19.

ONE. Move your hands, still sloped outwards, a few inches in opposite directions, the right hand to the right and the left hand to the left.

TWO. Turn your hands a little so that they slope slightly inwards.

THREE. Move your hands, still sloped inwards, to their first position.

FOUR. Turn your hands a little so that they slope outwards again.

Without numbers

Practise the same movements without numbers, smoothly and continuously, making quick easy passes, till the correct sloping of the hands becomes automatic.

Now practise the movements in water, lying on your back. Keep your hips well up, your arms nearly straight, and your hands as near as possible to your sides.

CHAPTER IX

TURNING

To turn about while swimming free in the water is comparatively simple, though there are many different ways of getting round, and the most effective way is seldom seen. To turn at the end of a bath during a race is a far more complicated matter, since you are bound first by your position with regard to the wall and secondly by the conditions of the race. It is best to begin by learning the free turn and then, if you intend to race, to pass to the racing turn, which is not needed for ordinary purposes.

All the turns, whether free or racing, should be practised equally in both directions, unless you find it more difficult to turn one way than the other. If you do, practise turning that way till you can turn with equal ease either way.

1. The free turn

(i) *In the crawl, back crawl, and all strokes in which the arms are used alternately.*

To turn in the same direction as the hands of a watch.

Towards the end of your left arm-pull bring your knees, close together, to your chest, and at the same time roll on to your right side and sink your head. As soon as your left arm is free of the water send it quickly through the air over your head, and place it in the water parallel to the other and to the surface, both palms facing the same way as your body. Still keeping your knees at your chest, sweep your arms, unbent and parallel to the surface, away from you,

and then, bending the elbows and fingers, move your hands back and past your body. You will find yourself lying, still doubled up, with your head where your feet were. Straighten yourself out, and resume your stroke.

To turn in the opposite direction

✓ Towards the end of your right arm-pull bring your knees, close together, to your chest, and at the same time roll on to your left side and sink your head. As soon as your right arm (and so on, as above).

If the movement is correctly done your feet will not sink at all. One foot will remain at the surface all the time you are on your side.

If you turn on your near side, and start swimming after the turn with your off arm, the interval between one breath and another is quite short.

If you wish to finish the turn on your chest, incline your head towards your chest; if on your back, incline your head towards your back.

(ii) In the breast-stroke

When your knees are forward, keep them in the same position, put your head down, face your palms to one side, and swing your arms round to the same side just below the surface. This will spin your body round in the opposite direction. Shoot out your hands and kick as usual. Keep your back horizontal and your knees near your ribs all the time until the kick.

2. The racing turn

(i) In the crawl

First method

✓ Before your head is a yard from the end of the bath, look at the wall and decide which way you are going to turn.

If, when your head is a yard from the end, your left hand is in the air, or about to leave the water, turn to the right; if your right, turn to the left.

Let us assume that you are going to turn to the right. If your left hand is back in the water, take it out quickly and send it forward. As you approach the wall simultaneously (*a*) bring your knees, close together, to your chest; (*b*) roll on to your right side, and sink your head; (*c*) bend your right elbow and bring it to your side; and (*d*) place your left palm on the wall about water-level, fingers pointing right. Pull yourself round to the right with the hand on the wall, helping the turn with your right hand by moving it, palm left and hollowed, to the left, and inclining your head towards your chest; then, as you turn on to your face, send your hands forward in advance of your head, palms down, thumbs together. Your feet should now be planted firmly against the wall, your buttocks touching or near it, and your head between your arms. When your hands are together, and not before, push off from the wall with your legs, steadily at first, but with increasing force. Glide, with your toes pointed, your whole body straight, and your fingers bent back, till your speed begins to fall off; then pull with your near arm, and follow with your legs.

This method of turning, or some modification of it, is recommended in all swimming-books hitherto published, and is probably universal. Its advantage is that a competitor cannot be disqualified for not touching the wall. Its defect is that its efficiency is apt to depend on the position of the arms as the wall is approached. Even champions may be observed making a quicker turn, or a better push-off, at some times than at others. Moreover the pressure of the hand against the wall inevitably tends to send the body away from the wall; whereas it is important, before

the leg-drive begins, to stay as near the wall as possible. Experiments with the second method, which is simply the free turn adapted to racing, show that it produces at least as quick a turn with much greater certainty of an efficient push-off. With it the competitor is also independent of local conditions, such as a slippery wall or the presence or absence of a hand-rail. Its drawback is that judges accustomed to the other method may fail to notice the touch of the hand on the wall, and may disqualify the competitor.

Second method

Before your head is a yard from the end of the bath, look at the wall and decide which way you are going to turn. If, when your head is a yard from the end, your right hand is in the air more forward than back, or is forward just under water, turn to the right; if your left, turn to the left.

Let us assume that you are going to turn to the right. Your last arm-pull will then be that of your left arm. If it is deep in the water when your head is a yard from the wall, shorten your stroke and take your arm out quickly, elbow first. As you approach the wall, simultaneously (*a*) bring your knees, close together, to your chest; (*b*) roll on to your right side and sink your head; and (*c*) send your right hand forward under water, or keep it in place if it is already forward. As soon as your left arm is free of the water, send it quickly through the air over your head, touch the wall with it, and place it in the water, parallel to the other and to the surface, both palms facing the same way as your body. Still keeping your knees at your chest, sweep your arms, unbent and parallel to the surface, away from you, and then, bending your elbows and fingers, move your hands back and past your body. You are lying doubled up with your feet at the wall, your head away from it, and your hands, wrist forward, one on each side of your body.

Send your hands quickly forward in advance of your head, thumbs together. Your feet should now be planted firmly against the wall, your buttocks touching or near it, and your head between your arms. When your hands are together, and not before, push off from the wall with your legs, steadily at first, but with increasing force. Glide, with your toes pointed, your whole body straight, and your fingers bent upwards, till your speed begins to fall off; then pull with your near arm, and follow with your legs.

If you keep your head in line with your body, and bring your hands evenly to your sides, you will find yourself pushing off on your side. If this is not thought desirable, you can turn on to your face before planting your feet on the wall by inclining your head to your chest. There seems no objection, however, to gliding sideways, provided the head is raised a little during the glide and the off hand kept well up to the surface. The lungs can be filled during the glide and the first pull of the near arm (which may be used as in the side-stroke), and the body then be allowed to roll on to its chest.

(ii) *In the breast-stroke*

Turning is most easily effected if the head is about a yard from the wall when the arms are spread. Make this your aim. If your usual glide will take you¹ too near the wall, shorten it; if not near enough, lengthen it by putting in an extra half-kick. As soon as your hands are spread, slope them inwards and bring them together below the surface in advance of your head. This will keep your mouth out of the water a little longer, and enable you to take a deep breath. It will also send your hands to the wall. Bring your knees to your chest, close together, at the same time. Touch the wall with both hands simultaneously, sink your head, face your palms to one side, and swing your

arms round to the same side just below the surface. This will spin your body round as in the free turn, and bring your feet to the wall. Keep your back horizontal and your knees near your chest all the time. Now quickly send your hands forward and bring them together in advance of your head, thumbs touching, palms down. Your feet should now be planted firmly against the wall, your buttocks touching or near it, and your head between your arms. When your hands are forward, and not before, push off from the wall with your legs, steadily at first, but with increasing force. Glide, with your toes pointed, your whole body straight, and your fingers bent upward, till your speed begins to fall off; then bring up your legs, and kick.

(iii) In the back crawl

As you approach the end of the bath, throw back your head so that you can see the wall and decide which way you are going to turn. If, when your head is a yard from the end, your right hand is in the air more forward than back, or forward just below the surface, turn in the same direction as the hands of a watch; if your left, turn in the opposite direction.

Let us assume that you are going to turn in the same direction as the hands of a watch. Your last pull will then be that of your left arm. If it is deep in the water when your head is a yard from the wall, shorten your stroke and take your arm out quickly, elbow first. As you approach the wall, send your left arm forward, and also your right, if it is not forward already; and begin to double yourself up at the hips and knees. As soon as your right hand touches the wall, simultaneously (*a*) bring your knees, close together, to your chest; (*b*) roll on to your right side, and sink your head; and (*c*) carry your left arm over your head and

place it in the water, parallel to the surface and to your right arm, both palms facing the same way as your body. /Still keeping your knees at your chest, sweep your arms, unbent and parallel to the surface, away from you, and then, bending your elbows and fingers and throwing back your head, move your hands back and past your body. This will spin your body round and turn you on to your back, with your feet at the wall and your head away from it. Grasp the rail with both hands. Your feet should now be planted firmly against the wall, your buttocks touching or near it, your knees near your chin. Let go the rail, and make a strong spring, slightly upward, so that your body flies through the air and falls flat on the water. At the same time fling your arms forward so that your hands meet in advance of your head, palms up, thumbs together. Glide, with pointed toes and a slight upward curve from hips to head, till your speed begins to fall off; then pull with either arm, and follow with your legs.

In the crawl and breast-stroke many good swimmers turn in an almost upright position. This enables them to draw a deep breath during the turn, but there is inevitable delay in getting the body into a horizontal position again.

A good turn takes at most a second and a quarter from the touching of the wall to the straightening of the legs. As in swimming, however, the best way to attain speed is to practise at first very slowly, so that you can give all your attention to the correctness of the movements and the elimination of resistance. In any case violent movements only increase the resistance of the water.

The glide after the push-off does not merely save your

strength. You travel for some distance faster than you can swim. That is why times are always better in short baths than in long ones, in spite of the loss of time in turning.

/ Practise turning only, gliding till your speed is obviously less than that at which you swim, and starting to swim towards the wall at varying distances from it, until you can turn without hesitation, smoothly, and neatly, with an effective push-off, in whatever position your arms may be when you approach the wall. / Measure the length of your glide to test your progress. A short man should easily go thirty or forty feet before movement ceases, and a tall one more.

It is usual to start with the legs in the crawl, and with the arms in the breast-stroke. But it is clear that so long as the momentum of the dive or push-off lasts the leg-action of the crawl is useless for propulsion. (See pp. 75-6.) The arm-pull of the breast-stroke, too, as recommended in this book, is performed entirely for the purpose of breathing in, and is at this stage worse than useless, for you should have filled your lungs to the utmost just before the turn. If propulsion is mainly by the arms they should, of course, be used first.

Many races are lost through the swimmer slackening speed as he approaches the end of the bath, or turning badly, or pushing off weakly. He slackens speed because he has not clearly made up his mind what to do. Confusion of mind also often results in the glide being cut short. Probably most competitors start swimming too soon, thereby tiring themselves unnecessarily and sometimes actually checking the speed of the glide.

CHAPTER X

DIVING

ASCERTAIN the depth of the water before you dive. Objects under water look deeper than they are.

Plug each ear with a single piece of greased cotton-wool, to prevent undue pressure on the drums.

Fancy diving enlarges experience and helps to give ease and confidence in the ordinary dives, but is beyond the scope of this book.

1. Hands on bottom

Stand first on land, bend your knees, and stoop down with your hands flat on the floor in front of your feet, your elbows straight, and your arms touching your ears. Now try to do the same in water waist-deep. If you take a deep breath before making the attempt, you will probably find that the buoyancy of the water, as long as you stand firm, prevents you from getting your hands to the bottom. Hold your breath, put your hands and then your head as low as you can in the water, and spring lightly off the bottom, at the same time pointing your head and arms, touching at the ears, directly downwards. Your hands will now go to the bottom. Bend your wrists, so that you touch the bottom with your palms. At the same time double up your hips and knees. Then straighten your legs upwards, so that you 'stand on your head,' – really on your hands. Double yourself up again at the hips and knees, let down your legs, at the same time bending your head and hands upwards, and stand up.

Provided you have water waist-deep all round you, so that you cannot strike anything solid when you come down, you cannot hurt yourself. The water is safer than any feather-bed. The exercise is useful even if you do no more than touch the bottom with your hands. It gets you used to being head down in water, and teaches you to protect your head with your hands against the only danger, – that of striking the bottom with your head. But the upward straightening of the legs makes it still more useful, as this straightening is essential to all good diving. You may find it unpleasant at first to get water up your nose, but you will soon cease to notice it.

2. Swimming under water

Stand in water waist-deep, legs wide apart. Stoop down with your arms straight and parallel to each other and at about half a right angle to the surface. Bend your knees, place your head between your arms, take a deep breath, and spring off the bottom. Close your legs, and steer yourself, in the resulting glide, along the bottom with your head and hands. Lowering them will send you down; raising them will send you up. Perform one or more sole-kicks, remaining near the bottom, with your arms touching your ears, and practise till you can travel in this way under water at least five times your length.

This exercise gets you used to staying under water, and gives you confidence in diving. You also learn how to steer yourself up or down with your head and hands. Your fingers should be closed, and your thumbs and forefingers touching, as in all glides. It is best not to attempt to dive until you can go five times your length under water.

3. Dropping in from knees

The depth of the water for this and the next two exercises should be neither less than your height, nor more than twice your height. The bottom should be smooth, without rocks or weeds. It is best to make the first attempt from a few inches at most above the surface. Later on the height above the water may be increased to two or three feet. To save the knees a towel or bathing-costume may be placed under them as a pad.

Kneel at the edge of the water. Bend your body and bow your head as low as possible. Place your arms one on each side of your head, touching your ears. Straighten your elbows, and bring your thumbs and forefingers together, fingers closed and straight or bent back. Placing your head and arms as low as you can, so that they point more and more directly to the bottom, and taking a deep breath, raise yourself gradually on your knees till you lose your balance and fall in. If you relax all your muscles (except those of your arms, which should be kept rigid) when you lose your balance, your hips and knees will straighten themselves naturally as they enter the water, and you will go in without any splash. Open your eyes under water. If you keep your arms pointing down, as before, your hands may touch the bottom. If they are about to do so, bend back your wrists, so that you touch the bottom with your palms, raise your head, and push yourself off the bottom with both hands. This will send you up to the surface. But if you raise your head and hands as soon as they enter the water you will reach the surface much sooner. Be careful to raise your head with or before your hands, never after them.

Take your time about coming up. There is no hurry. Even if your head goes down six feet or more (which it cannot do if you raise it as soon as it is under water) you

will reach the surface, unless you are heavier than water, in a very few seconds without doing anything; and you can hold your breath, if you have done the last exercise, for several times as long. If, when you have raised your head and hands, you think you are not going up fast enough, sweep your arms down, unbent, one on each side of you. This will bring you to the surface from a considerable depth. If (though this is hardly possible) you find yourself with your head up and your arms down, and not moving towards the surface, slowly bring your arms along your body as in the back-stroke on p. 105, or slowly spread your knees, or do both, and swim up. But remember that, just as it is possible to swim up, it is also possible to swim down; and that if you sweep your arms, or jerk your knees, towards the surface you will force yourself down even when your natural buoyancy is sending you up.

The essential things in diving are to make the hands enter the water before the head, and the hips before the knees. If your head reaches the surface before your hands, you will get a smack on the face; if your knees reach it before your hips, you will get a blow on the thighs and middle. The advantage of this exercise is that the starting position makes the first impossible unless you throw up your hands while falling, and the second equally impossible unless you make an effort to keep your hips from straightening. If you hold your breath and get some one to push you over unexpectedly, you will enter the water at the right angle with your hips straight, and probably your knees also. If you keep your hands always as low as possible till they enter the water, you can only spoil the dive by conscious muscular action: such as stiffening the hips to prevent their natural straightening; raising the feet from the floor while still kneeling, which may prevent the knees from straightening;

and pressing your insteps down on the floor, which may result in your scraping your shins as you go in.

This method of entering the water, while avoiding all shock, sends you deeper than you would normally go with other methods. But for that very reason it is the best for a beginner, since it accustoms him to going deep, and therefore prevents him from getting a fright if he goes deep with the other dives, as he is certain to do sooner or later. If you have done the last exercise there can be no objection to your going deep, and nothing is left to chance.

This method also teaches you to protect your head, so that even if you strike an obstacle unexpectedly you should not hurt yourself seriously. Many fatal accidents would have been avoided if it had been followed in learning to dive.

✓ 4. Dropping in head first from feet

See beginning of Ex. 3. Stand at the edge of the water, feet together, knees a little bent. Stoop down till your chest touches your knees. Place your arms on each side of your head, touching your ears. Your arms will now point almost directly to the bottom. Take a deep breath, and without altering the angle of your arms to the surface raise yourself on the balls of your feet till you fall in. Bend up your head and hands and come to the surface as in the last exercise.

See the remarks on the last exercise. As your head starts from a greater height, you will naturally go deeper than from the knees, unless you bend up your head and hands quickly as soon as you enter the water. Do not attempt to spring. See that your arms point almost downwards when they reach the water. If they slope more

forwards you are likely to get a blow from the surface about the middle.

5. Dropping in with a spring

Repeat the last exercise, springing vigorously (in other words, straightening yourself vigorously at hips and knees) *after* you have lost your balance. Keep your legs together, and point your toes while they are in the air.

In this dive everything depends on the moment at which you straighten yourself, or spring. If you do so before you have lost your balance you will probably come down flat or on all fours, and hurt yourself. If you spring just after you have lost your balance, you will straighten yourself partly against the take-off and partly in the air. In other words, you will spring and then kick up your heels. The spring will send you some way out, and you will enter the water smoothly and at a moderate slope, legs in line with the body. If you go a little later, you will not spring at all, but will fall forward and then kick up your heels in the air, entering smoothly at a steep slope and nearer the take-off. If you go later still you will fall in close to the take-off as in the last exercise.

A dive with bent knees is a bad dive, but will not hurt you. The important things are to get yourself straight at the hips, and to do so at the right moment. Devote your attention to these two things first; then see to the straightening of the knees.

Even if this kind of dive is found more difficult than that described in the next exercise, it should be practised first; both because it gives you more experience, and because it is less violent and therefore less likely to hurt you if you make a mistake. It also enables you to go in more quickly, and to vary at will the depth of the dive and the point at which

you enter the water. For practical purposes, such as life-saving and picking up objects which have fallen into the water, it is far more useful than the standard dive, usually called the English header.

6. The English header

Stand erect,¹ but not stiffly, at the edge of the take-off, feet together, back straight, arms hanging at sides, hands relaxed. Raise your arms forward horizontally and parallel to each other, each hand in line with the arm, palm down, fingers and thumb together. When you are ready to dive, swing your arms, unbent, down and back, and then, smoothly and without a pause, down and forward. As they pass your knees during the swing-back, bend your knees slightly, throwing your weight on to the balls of your feet without raising your heels. As your arms again pass your knees, fling them forward and upward, and simultaneously make a strong spring in the same direction; your arms coming into place on each side of your head, elbows and wrists straight, palms in one plane, thumbs and forefingers touching, fingers of each hand pressed together and rigid, back straight or slightly arched, knees straight and rigid, toes pointed, legs pressed together. (If your back is arched, there should be a continuous curve from the fingertips to the toes, and therefore a slight downward bend at hips, neck, and wrists; if it is straight, these also must be straight. The back should not be arched in diving from a height of more than three feet or so. It should never be hollowed.) When about to enter the water, tense your muscles and keep every part of your body, especially the extremities, rigid till submerged. The entry, to the

¹ See p. 57.

immersion of the feet, should be as near as may be to the vertical, but never beyond it. Relax under water, and quickly raise your head and arms so as to come to the surface. Begin to breathe in as you lower your arms from the front, or half a second earlier, and continue inhaling till you are near the water; then hold your breath.

These directions are based, with some additions, on those printed in the handbook of the Amateur Diving Association for 1930. No points are given in a competition for a return to the surface; but a quick re-appearance, made by bending up the head and hands as soon as they are under water, has a neat effect, and should in any case be practised for safety.

The more vigorous the spring, the easier it is to keep your balance in the air, to stiffen your limbs, and to enter the water at the proper angle. Be careful to spring from both feet evenly. The further out you strike the water, the less likely you are to hurt yourself, provided you enter it with your head down, your hands protecting your head, and your hips straight or bent back.

It is a good plan to turn the big toes down over the edge of the take-off. This prevents slipping, and therefore gives confidence. It also facilitates the pointing of the toes and straightening of the knees which most beginners find the most difficult thing in diving.

For high diving see the next exercise.

7. The swallow dive

Begin the dive as in the last exercise, but with a more upward spring, and the chin slightly raised. Instead of bringing your arms together when they are flung forward, spread them in opposite directions, in line with the shoulders

as nearly as is consistent with their being drawn well back so as to expand the chest. At the same time slightly hollow your back, and force your legs well back from the hips. Keep your arms for a while in the same position, but before you reach the water bring them together, one on each side of your head, as in the last exercise. The body, and especially the legs as they disappear beneath the water, should be as nearly as possible in line with its course through the air.

These directions are based on the rules of the International Swimming Federation (*Fédération Internationale de Natation Amateur*) which were superseded by the far briefer set printed in the Federation's handbook for 1930-1. They seem not inconsistent with the intended meaning of the new rules.

The name 'swallow dive' is English. The Americans use the term 'swan dive,' and the French 'saut d'ange' (angel's leap).

Keep your back straight before and during the spring. A spring with a hollow back is unsightly, and the hollowing should be deferred till the body is high in air.

The swallow dive is more suitable for high diving than the English header, as the spreading of the arms steadies the body in the air. It is unsuitable for a low dive, since there is no point in spreading the arms unless they can remain for a while outspread.

You will observe that the curve of the body in the high dive is just the opposite of that in the low dive. In the one case the body is hollowed, in the other it is either straight or arched. In diving from a height the natural tendency is for the body, if held straight, to pass the vertical; when, therefore, the body is at its highest point in the air, the middle of any curve it may have

must be lower than the ends. In diving from near the water the natural tendency is to go in too flat; when, therefore, the body is at its highest, the middle of any curve it has must be higher than the ends.

8. The racing dive

Stand as for the English header (Ex. 6), with your toes bent over the edge of the take-off. On being warned to prepare for the start, bend your knees a little, incline your body forward, and raise your arms horizontally in front of you and parallel to each other, palms down, thumb and fingers together in each hand. Then swing your arms, unbent, down and back as far as they will go, further inclining your body till it is nearly horizontal. At the signal to go swing your arms down, bending your knees sharply as you do so, and then forward and upward. As they pass your knees spring forward strongly, your arms coming into place on each side of your head, touching your ears; elbows and wrists straight; palms down; fingers closed, bent up, and rigid; thumbs and forefingers touching; back straight; knees and then hips rapidly straightening and then held stiff; toes pointed; legs pressed together. Your spring should carry you through the air so that your hands enter the water at a point not less than twice your length from the take-off. Your body, at the moment of entry, should be straight from the fingers to the toes, and all but horizontal. When it has entered, bend up your head and hands just enough to bring the back of your head to the surface, but no more; a very slight bend should be enough. Then straighten yourself again, and keep your limbs rigid till you begin swimming. Start, in the crawl or trudgen, with the near

PLATE VI

THE RACING DIVE



READY TO SPRING



IN FULL FLIGHT

arm, and in the breast-stroke with the leg-recovery. See last paragraph but one of Chap. IX, p. 114.

Do not expect to enter the water smoothly, as in the other dives. Rather are you likely to get a hard smack in the face.

GLOSSARY OF SWIMMING TERMS

The words printed in italics are defined in this glossary. Terms used, so far as is known, for the first time in this book are marked with an asterisk.

✓ AUSTRALIAN CRAWL. A term often used to indicate a combination of *double over-arm* with *thrash*.

BACK CRAWL. A *back-stroke* with *flutter*, *thrash*, or *scissors*, and alternate arm-action.

BACK STROKE. Manner of swimming on the back.

BEATS. Alternate depressions of the legs in the *crawl*. In a six-beat *flutter* each leg is depressed three times (left, right, left, right, left, right).

BREAST-STROKE. A *stroke* in which the swimmer lies on his face and in which the movements of the limbs are symmetrical and mostly lateral.

CRAWL. A combination of *double over-arm* with *flutter*, *scissors*, or *thrash*.

DOUBLE OVER-ARM. Arm-action in which the arms are alternately raised above the water during *recovery*, the body lying on its chest.

DRIVE. Force applied by the arms or legs in the opposite direction to that in which it is desired to move; in other words, a *pull* or *kick* made directly backwards.

FLOAT. To remain at the surface of the water without movement.

FLUTTER. An alternate up-and-down movement of the

legs from the hips, in which the knee and ankle muscles are relaxed, so that the action of forcing the leg up or down against the water bends it at the knee and straightens it at the ankle, or straightens it at the knee and bends it at the ankle.

GLIDE. To progress through the water with the limbs at rest.

KICK. Any movement of either leg that helps to propel the body or to support any part of it.

*NEAR ARM. The arm which is nearer to the face during inhalation; the top arm when the body is on its side.

✓*OFF ARM. The arm which is further from the face during inhalation; the under arm when the body is on its side.

*PADDLE. To move the hands to and fro with a continuous downward pressure for purposes of support.

✓PULL. Any movement of either arm that helps to propel the body or to support any part of it.

RECOVERY. Any movement of arm or leg which does not help to propel or support the body, but which is necessary in *swimming*.

SCISSORS. An alternate movement of the legs from the hips in parallel planes. Knees and ankles are kept more or less straight, and the legs approach each other rapidly and are parted slowly.

*SCISSORS CRAWL. A *crawl* in which a *scissors* action is substituted wholly or in part for the *flutter*.

SCULL. To move the hands to and fro with a continuous pressure towards the rear.

*SHIN-KICK. See *sole-kick*.

SIDE-STROKE. A *stroke* in which the swimmer lies on his

side and propels himself by means of the *stride* and one or both arms.

SINGLE OVER-ARM. Arm-action in which only one arm is raised above the water in *recovery*.

/ *SOLE-KICK and SHIN-KICK. *Kicks* in which the legs are opened and closed symmetrically and more or less laterally. In the sole-kick only the hip-muscles are used. The knees are separated widely, the legs from knee to ankle remaining more or less parallel to the surface and to each other. The soles are then thrust back against the water, and the legs, thus straightened, are forcibly closed.

In the shin-kick the power, except for the closure of the legs, comes entirely from the knee-muscles. The thighs remain in the same plane as the body, knees apart, and the feet are raised close together. The shins and insteps are then forced against the water, and the legs, thus straightened, are forcibly closed.

STRAIGHT CRAWL. A combination of *double over-arm* with *flutter*.

*STRIDE. Leg-action in which the legs are slowly opened, much as in running, and then forcibly straightened and closed.

STROKE. 1. Manner of swimming. 2. A cycle of the arm-movements in swimming.

SWIM. 1. To perform movements in water that support or propel the body. 2. To propel oneself in water by means of the limbs.

THRASH. An up-and-down alternate movement of the legs, mainly or entirely from the knees, in which the knees are bent slowly and straightened forcibly.

TRUDGEN. A combination of *double over-arm* and *stride*.

TRUDGEN CRAWL. A term applied by some trudgeners to a *trudgen* with the addition of a *thrash*, and by some crawlers to a *scissors crawl*.

UPPER ARM. That part of either arm which is between the shoulder and the elbow. (The ambiguous use of the term for the arm which is uppermost or nearer to the face at the moment is avoided in this book.)



ALLAMA IQBAL LIBRARY



18738

INDEX

- AGE for learning crawl, 52 ; for learning to swim, 5
- Air, emptying lungs of, 11, 15, 21; swallowing, 10
- Amateur Diving Association, 122
- Arm, near, defined, 127; off, do., 127 ; upper, do., 129 ; weight of, 72
- Arms, starting with, 114, 124-5; strength of, 35
- Artificial supports, objectionable in first attempts, 5; use of, 48
- Assistance in learning from book, 4, 33
- Athletics, 29
- Australian crawl, 126
- BACIGALUPO, 35, 76
- Back arm-stroke, alternative, 105-6; "racing" stroke, 104
- Back crawl, 101-4
arm-action, 101-3
breathing, 103
carriage of head, 104
defined, 126
kick, 103, 104
rolling, 103-4
superiority of, 101, 104
swimming, 103-4
turning, 107-8, 112-13
- Back, floating on, 21-3; gliding on, 24; lying on, not favourable for speed, 29; meaning of straight, 57; sole-kick on, 44-5, 104-5, 105-6; stroke, defined, 126; strokes, 44-5, 101-6; to be straight, 25, 37, 44, 45, 50, 51, 54, 57, 79, 121, 123; turning on to, 24
- Balance, in crawl, 72-3, 79; in diving, 120; in floating, 22, 23; in gliding on side, 25; in water, 16
- Balancing, 12; on one leg, 13; when pushed, 13
- Bathers, their ways, 1, 2; their first need, 7
- Beats, defined, 126
- Beginners, 3, 7-27; best position for, 38; should practise as if going long distance, 32-3; sole-kick for, 39; time taken over stroke by, 34
- Borg, Arne, 75
- Breast-stroke, 38-51
a racing-stroke, 38
arm-action, 39-40, 41-2, 43-4, 46-9
back should be straight, 44, 45, 50, 51
breathing, 40-1, 47
carriage of head, 35-6, 50
defined, 126
difficulty of breathing in, how overcome, 30
Don'ts, 51
easiest for beginner, 38
finger-joints to be bent upwards, 45
glide, 45
horizontal position, 50
improvement in, 29
keeping up hips, 44-5
leg-action, 39, 42-6
leg-recovery not to begin till face is in water, 50
length of stroke, 49-50
merits and defects, 38
objection to drill on face, 41
position of elbows, 41-2, 50
propulsion, 38-9
seaside bathers' attempts at, 1
smoothness of movements, 44, 45
sole-kick and shin-kick, 39
symmetry, 51

Breast-stroke, *continued*

time to be taken over stroke, 49;
turning, 108, 111-12, 113-14

Breath-control, 2, 7; must be unconscious, 8, 9

Breath, holding, 11; not to be held in swimming, 78; swimmer should slow down when out of, 33

Breathing, 9

can be learnt on land, 6, 31
difficulty of, when on face, 29
in breast-stroke, 40-1, 30
in crawl, 53-4, 59-60, 62-4
in floating on back, 23
in side-stroke, 84-5, 90
must be unconscious, 30
on either side, 36
out under water, 2, 10
rate should be normal, 12, 31, 49
should be steady and regular, 36
time taken in, 31
to regulate movements, 47
upset by turning, 33
while circling with arms, 27
with water in mouth, 9, 10

Buoyancy, 14, 21; in salt water, 15, 22; of water, result of, 7, 115

Buttocks, objections to raising, 51

CHANNEL SWIM, time taken over stroke in, 52

Childhood, advantages of, 5

Children, buoyancy of, 21-2; can be taught in ordinary bath, 12; treatment of, 5, 6

Circling with arms, 26-7

Clothing in drills, 31

Control of movements, 37; of muscles, 57

Corson, Mrs., time taken over stroke by, 34, 52

Crawl, 52-80

age for learning, 52
appearance of heel above surface, 71

arm-action, 54-62

Arne Borg in, 75

Australian, 126

Bacigalupo in, 35, 76

Crawl, *continued*

better not swum unless swum correctly, 52

breathing, 53-4, 59-60, 62-4, 78

carriage of head, 35-6, 62, 72

defined, 126

Don'ts and Whys, 78-80

drawing back legs, 56-7

drill at wall, 57-8

entry of arm in water, 74, 78

flutter, 67-72, 76-7

holding body straight, 57

how not to learn leg-action, 71

keeping up legs, 16, 77

merits and drawbacks, 52

movements to be unconscious, 60

nonsense talked about, 52

propulsion by legs, 75-7

pseudo-, 2

recovery of arms, 73-4

relaxation of muscles, 59, 61

rigidity to be avoided, 57

rolling, 72-3

scissors, 76, 77

slow and rapid movements, 61

thrash, 76, 77

time taken over stroke by Mrs. Corson, 52; by Weissmuller, 34

turning, 107-8, 108-11, 113-14;
head to side, 60

turning in toes, 69

use of shoulder, 53-9, 66, 73

Weissmuller in, 34

when arm should be bent, 75

when force should be applied, 74-5

DANGER in diving, how to avoid, 118-19; of going down in deep water after emptying lungs, 15, footnote; of striking bottom with head, 116; of swimming before learning supporting movements, 8; value of efficient stroke in, 30

Depth of water for diving, 115, 117; for preliminary exercises, 12

Differences between individuals, 1, 35, 47

- Difficulties more easily surmounted if known, 4; most can be mastered on land, 6
- Difficulty of breast-stroke removed, 38; of breathing in breast-stroke, how overcome, 30; of breathing when on face, 29; of getting rid of bad habits, 32; of knowing own movements, 32; of simultaneous slow and rapid movements, 61, 75; of slowing down when out of breath, 33
- Diving, 115-25
 advantages of learning by dropping in, 118-19, 120-1
 danger of striking bottom with head, 116
 depth of water, 115, 117
 dropping in head first from feet, 119-20
 from knees, 117-19
 with a spring, 120-1
 English header, 121-2
 fancy, beyond scope of book, 115
 hands on bottom, 115-16
 high, 123
 how to avoid danger, 118-19
 losing balance, 120
 plugging ears, 115
 racing dive, 124-5
 re-appearance after, 122
 saving knees, 117
 standing on head, 115
 steering under water, 116
 straightening of hips and knees, 116, 120
 swallow dive, 122-4
 swan dive, 122-4
 swimming to surface, 117-18
 under water, 116
 turning toes down, 122, 124
 when rigidity is needed, 121, 124
 whether arms or legs should be used first, 124-5
- Don'ts and Whys in crawl, 78-80
- Double over-arm, 64-7; defined, 126
- Drills, see Exercises on land
- Drive defined, 126
- Dropping in from knees, 117-19; head first from feet, 119-20; with a spring, 120-1
- Drowning as result of ignorance, 7; of learning to swim, 8; of too rapid strokes, 1; belief as to cause of, 19
- EARS to be plugged, 12, 115
- Elbows, position in breast-stroke, 16-17, 42, 50
- English header, 121-2
- Erect position, meaning of, 57
- Exercises in water:
 back crawl, 103-5
 back-stroke, 105-6
 breast-stroke, 44-51
 crawl, 62-80
 diving, 115-25
 preliminary, 12-19, 20-5, 26-7
 sculling, 106
 side-stroke, 87-92
 trudgen, 99-100
 turning, 107-14
- Exercises on land (breathing):
 breast-stroke, 40-1
 crawl, 53-4
 preliminary, 9-11
 clothing in, 31
 looking-glass useful in, 32
 (movements): back crawl, 101-3
 back-stroke, 105
 breast-stroke, 41-4
 crawl, 54-62
 sculling, 106
 side-stroke, 81-7
 trudgen, 93-9
- Exercises, preliminary, 7-27; should be returned to, 33
- Eyes open under water, 10, 16
- FACE, difficulty of breathing when on, 29; regaining feet when down, 15; lying on, favourable for speed, 29; objection to drill on, 41; turning on to, 23
- Fancy diving beyond scope of book, 115
- Faults, how to correct, 80

- Fear of mouth going under water,
1, 2, 23; of water, 3, 5, 7
Feet, regaining, 14, 15, 18, 22-3
Floating defined, 126; drawbacks,
18-19; on back, 21-3; on face,
15-16
Flutter, 67-72; advantage of, 76;
defined, 126-7; effect of, 75-6;
how not to learn, 71
Free turn, 107-8
- GLIDE, 35; after push-off, 113-14;
defined, 127; in side-stroke, 91;
measuring length of, 45; quasi,
in crawl, 74; use of muscles dur-
ing, 45
Gliding, face down, 16-17; on
back, 24; on side, 24-5
Glossary of swimming terms, 126-
9
Grasping object for support, 17
Gymnasiums, teaching swimming
in, 6
- HANDS on bottom, 115-16
Head, carriage of, 25, 35-6; in
crawl, 62, 72; standing on, 115-
16; turning to side, 60; upright
position necessary for comfort,
19; weight of, 35
Header, English, 121-2
High diving, 123
Hip, to be kept up, 25
Hips, drawing back legs from,
56-7
Holding breath, 11
Horizontal position best for be-
ginner, 38; importance of, 28-
30; with head up, 1
- ILLUSTRATIONS not really needed, 4
Imitation, learning by, 4, 5
Individual differences, 1, 35, 47
International Swimming Federa-
tion, 123
Instructions should be read by
friend, 33; why elaborate, 4
- KICK defined, 127
Knees, dropping in from, 117-19
- LAND, exercises on: *see* Exercises on
land
Leg-action, belief that - is neces-
sary for support, 19
Legs, behaviour of, in water, 16;
crawl without using, 35; func-
tion in crawl, 75-6; how to draw
back from hips, 56-7; how to
get to surface, 16, 22; how to
keep up, 77; sole means of pro-
pulsion in breast-stroke, 39;
starting with, 114, 124-5;
straightening of, essential to
good diving, 116; supported by
resistance of water, 17
Length of glide, 45; of stroke, 34,
35
Life-saving, 6
Lungs, capacity of, 22; emptying,
11, 15, 21
- MODERN SWIMMING, 28-37
Mouth, breathing with water in,
9, 10; dread of going under
water, 1, 2; how to keep above
water, 14, 18, 21, 22, 23, 24;
open under water, 9; under
water, easiest way to learn swim-
ming, 38
Movements: automatic regard-
less of position, 31; can be
learnt on land, 6; considered
with reference to body, not to
earth's surface, 31; importance
of slowness, 11, 12; in water,
how to watch, 33; need of prac-
tising each separately in water,
32; not to be attempted in water
till practised thoroughly on land,
31; of limbs in water, 5, 6, 7;
should be unconscious, 31, 60;
should be watched by friend,
33; smoothness of, 12, 37; to be
regulated by breath, 47; vigor-
ous with minimum of effort, 36
Muscles, relaxation of, 5, 11, 21,
37; use of stronger, 28
- NEAR ARM defined, 127
Nose, breathing through, 9

- OFF ARM defined, 127
- Over-arm, double, 64-7, 126;
single, 92, 128
- PADDLING, 19-21; defined, 127
- Physical training, swimming drill
as, 6
- Power, direction of, 28; maximum
from both arms and legs, 39-40
- Preliminary exercises, 7-27
- Principles of swimming, 28, 37
- Pull defined, 127
- Push-off, 113-14. *See also* Turning
- RACES, how lost by bad turning, 114
- Racing dive, 124-5; turn, 108-14;
waste of power by reducing
glide, 35
- Record times in swimming, 29
- Recovery defined, 127
- Regaining feet, 22; after squat-
ting, 14; when face down, 15;
when leaning back, 18
- Relaxation of muscles, 5, 11, 21,
37; in crawl, 59, 61
- Resistance of water, 17, 28, 35, 40,
48, 91, 118
- Rigidity fatal to good swimming,
57; when needed, 121, 124
- Royal Life-Saving Society, 6
- SAVING LIFE, 6
- School, teaching swimming in, 6
- Scissors, 76-7; defined, 127; -crawl
defined, 127
- Sculling, 106; defined, 127
- Seaside bathing, 1, 2
- Sea-water, weight of, 22
- Self-instruction, 4, 33-4
- Shallow water, 1, 7, 18, 39
- Shin-kick, 39; defined, 128
- Shoulder, mechanism of, 58; use
of, 58-9, 66
- Side, gliding on, 24-5
- Sides, practising on both, 25, 36
- Side-stroke, 81-92
arm-action, 81-5
breathing, 84-5, 90
defined, 127-8
Don'ts, 92
- Side-stroke, *continued*
glide, 91
kick, 85-7, 88-9
merits and defects, 81
propulsion, 81
resistance, elimination of, 91
single over-arm, 92
swimming, 90-2
turning, 107-8
- Single over-arm, 92; defined, 128
- Smoothness of movements, 37; in
breast-stroke, 44, 51
- Sole-kick, 39, 42-3, 45-6; defined,
128; on back, 44-5, 104-5,
105-6
- Speed in swimming, 28-30; posi-
tion most favourable for, 29
- Splashing sign of wrong action, 71,
75
- Squatting and regaining feet, 14
- Standing on head, 115-16
- Steering under water, 116
- Straight back, meaning of, 57.
See Back
- Straight crawl defined, 128
- Strength not needed for swim-
ming, 3
- Stride, 85-7, 88-9; defined, 128;
merit and defect, 76
- Stroke, choice of, 2, 52; defined,
128; length of, 34, 35, 45; time
taken over, 34, 52
- Strokes, 29
- Style, 35
- Superstition about learning to
swim, 7, 8
- Suppleness, 5, 69
- Support, belief that leg-action is
necessary for, 19; contrivances
for, 5; for legs, artificial, 48;
how to grasp object for, 17; of
swimmer by water, 3; slope of
palms for, 19, 20
- Supporting action, 18-21, 26-7;
need of learning before begin-
ning to swim, 8; substitute for
swimming, 2
- Surface, swimming to, 117-18
- Swallow dive, 122-4
- Swallowing air, 10

- Swan dive, 122-4
- Swimming: a difficult art, 3, 4
 defined, 128
 easiest way to learn, 30
 foolishness of, before supporting
 action is learnt, 8
 for pleasure, 30
 importance of breath-control, 8
 luxurious form of exercise, 3
 modern, 28-37
 not to be begun till movements
 practised on land and separ-
 ately in water, 32
 principles of, 28, 37
 progress in, 29
 records, 29
 seaside bathers' attempts, 1, 2
 should be continuous, 32-3
 should be learnt step by step, 4
 strokes, 29
 superstition about learning, 7-8
 terms, glossary of, 126-9
 to surface, 117-18
 under water, 116
 usual way of learning, 32
 what is, 18
- Symmetry, necessity for, in breast-
 stroke, 43, 51
- THRASH, 76-7; defined, 128
- Time taken over stroke, 34, 31;
 by Mrs. Corson, 52; by Weiss-
 muller, 34; to breathe in and
 out, 31; to make good turn, 113
- Times in swimming, 29
- Timing necessary to determine
 length of glide for racing, 35
- Toes, reason for turning in, 69
- Trudgen, 93-100; defined, 128;
 turning, 107-8
- Turning, 107-14
 free turn, 107-8
 glide, 113-14
 in back crawl, 107-8, 112-13
 in breast-stroke, 108, 111-12,
 113-14
 in crawl, 107-8, 108-11, 113-14
 in trudgen and side-stroke,
 107-8
- Turning, *continued*
 in upright position, 113
 on to back, 24
 on to face, 23
 push-off, 113-14
 racing turn, 108-14
 should be practised separately,
 33, 114
 while erect, 12-13
 while swimming, to be avoided
 by beginners, 32-73
- UNCONSCIOUSNESS of movements,
 31, 60
- Upper arm defined, 129
- VIOLENCE in swimming, 1, 2, 3;
 nonsense regarding, in crawl, 52
- Visualisation, 31
- WALL, drill against, 57-8
- Water, breathing out under, 10
 depth of, for diving, 115, 117;
 for preliminary exercises, 12
 ease in shallow, 18
 effect of buoyancy, 7, 15
 exercises in, *see* Exercises in
 water
 in mouth, 9-10
 in windpipe, 9, 19
 movements of limbs in, 5, 6
 need of practising each move-
 ment separately in, 32
 resistance of, 17, 28, 35, 40, 48,
 91, 118
 steering under, 116
 walking in, 7
 visualisation of, 31
 weight in, 14, 21-2
 weight of, 22
- Waterwings, objectionable in first
 attempts, 5; use of, 48
- Weight in water, 14, 21-2; of
 sea-water, 22
- Weissmuller, carriage of head, 36;
 length of stroke, 34
- Whip, comparison of leg with, 69
- Windpipe, water in, 19
- Women, buoyancy of, 21

